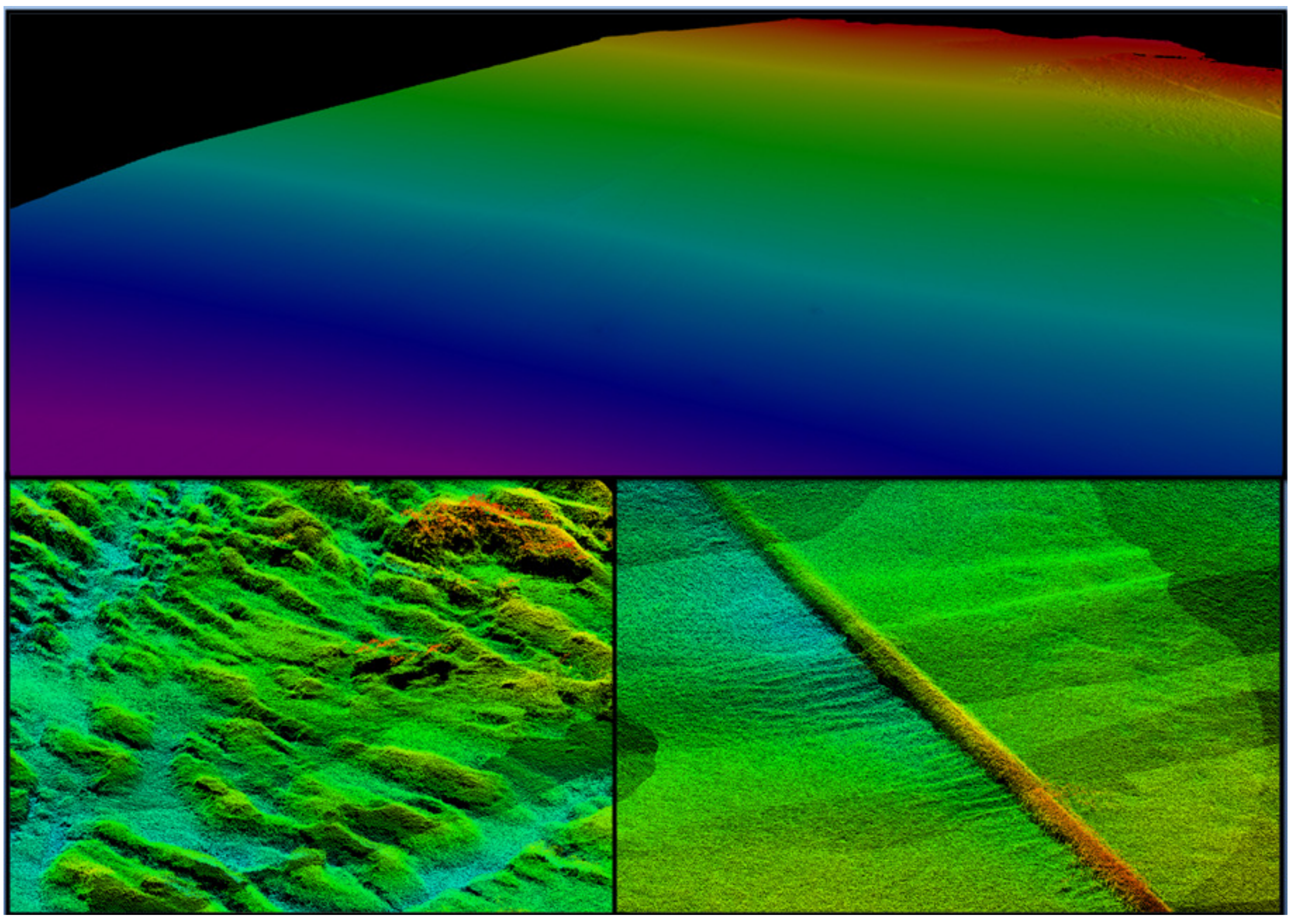
Hydrographic Survey

Encina Marine Oil Terminal Decommissioning Project

Carlsbad, CA



Report of Survey

Pre Decommissioning

October 18th 2017

Contractor Document No: CURT_2017_CABRILLO_REPORT_OF_SURVEY_A2.docx

10/27/2017	A2	Issued to client	NPJG			10/27/17
10/18/2017	A1	Issued to client	NPJG			10/18/17
Date	Revision	Description of Revision	Prepared	Checked	Approved	Client

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PRELIMINARY REPORT CONTENTS

FIGURES

TABLES

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ABBREVATIONS

ACSM/THSOA - American Congress on Surveying and Mapping/The Hydrographic Society of America
AML - AML Oceanographic Systems
CMR+ / CMR 94 – Compact Measurement Record
CORS - Continuously Operating Reference Stations
GAMS - GNSS Azimuth Measurement System, GAMS™
GLONASS - Global Navigation Satellite System
GNSS - Global Navigation Satellite System
GPS - Global Positing System (US System)
GRS - Geodetic Reference System
ID - Identification number
LIDAR - Light Detection and Ranging
MBES - Multibeam Echo Sounder System
MLLW - Mean Lower Low Water
NAD83 - North American Datum 1983
NAVD88 - North America Vertical Datum 1988
NGS - National Geodetic Survey
PPK - Post Processed Kinematic
QINSy - Quality Integrated Navigation System
QC - Quality Control
QPS - Quality Positioning Systems
RTK - Real Time Kinematic
SBET - Smoothed Best Estimate of Trajectory
SVP - Sound Velocity Profile(r)
USM - Universal Sonar Mount
USACE - United State Army Corps of Engineers
WGS84 - World Geodetic System 1984

EXECUTIVE SUMMARY

Between September 25th and 29th 2017 eTrac Inc. completed a hydrographic survey of an area approximately 5,500ft from shore and 3,800ft wide, centered along the Cabrillo Power I LLC, Encina Power Station pipeline in Carlsbad, California. This survey is the pre-decommissioning survey for the Encina Marine Oil Terminal Decommissioning Project.

The objectives of the survey were as follows:

1) Create a bathymetry grid of seabed depths across the area
2) Position and create pipeline alignment where pipe exposed
3) Locate debris objects on the seabed
4) Determine the extents of rock outcroppings
5) Determine the extents of kelp beds

Detailed information on the seabed depths were recorded with full coverage multibeam.

The exposed pipeline was clear in the multibeam and the pipeline alignment was well defined. The pipeline was exposed on the seabed for approximately 1000ft.

Seventeen (17) debris objects were located on the seabed. These ranged from 4ft in length to 12ft. Thirty-two (32) objects resembling rocks or boulders were also identified. Rock outcroppings were able to be determined in the multibeam data with a clear transition from sand to rock substrate.

The rock outcroppings were located in one large (44 acres) and one smaller (3.3 acres) contiguous areas. Adjacent to these were several smaller (0.05 acres or less) rock outcropping areas. All the rock outcroppings were located in the south eastern part of the survey area.

Kelp beds were identified in the multibeam data. The kelp bed locations correlated with the rock outcroppings. The areas covered by kelp beds ranged from 9.5 acres to 0.04 acres.

1. INTRODUCTION

a. Survey Area

This report is prepared for Curtin Maritime Corp. (Curtin) by eTrac Inc (eTrac) for the Encina Marine Oil Terminal Decommissioning Project.

Figure 1 shows the project area. The survey area was designated by Curtin Maritime. Coverage was obtained up to the border offshore and then along shore as close as possible while maintaining safe survey conditions.

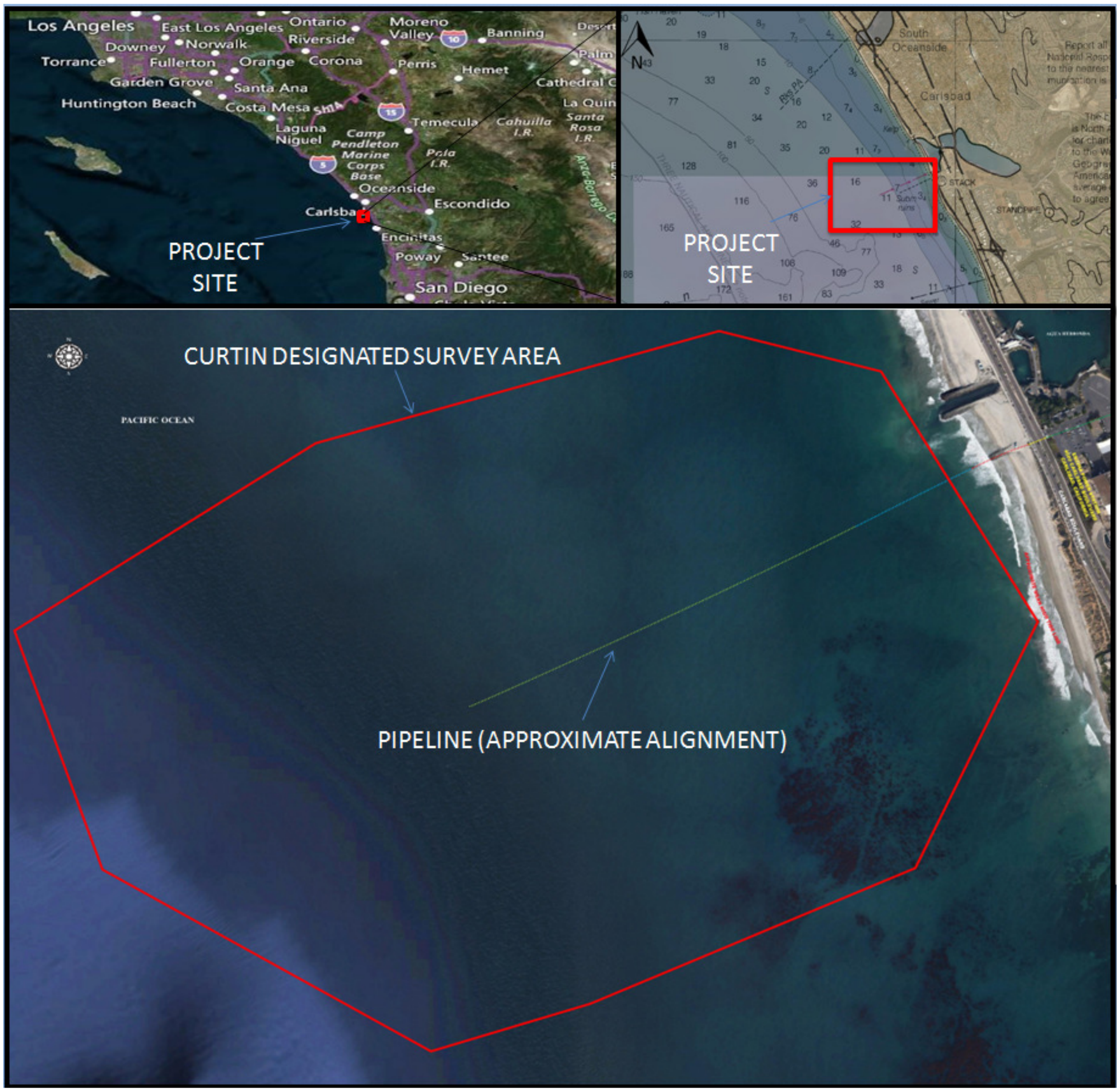


Figure 1 Survey area location

b. Company Overview

eTrac Inc. was established in 2003 as a hydrographic and geophysical surveys, vessel positioning and instrumentation firm. eTrac has several offices along the US West Coast including San Francisco, Seattle and Anchorage. The firm has earned a strong reputation among many sectors of the hydrographic industry, including government agencies and private industry. Its equipment fleet has also grown to include 9 aluminum geophysical survey vessels as well as several ultraportable, shallow water survey craft. eTrac's role has grown over the years to include a strong group of full-time staff as well as several localized vessels to support the work required by USACE, marine construction, engineering firms and petroleum industry contractors on the west coast. eTrac is committed to continual re-investment in industry leading equipment and knowledgeable staff to complete multibeam, singlebeam, sidescan, mobile LiDAR and water-level surveys required by our clients. Staffed with professionally licensed land surveyors and ACSM/THSOA (American Congress on Surveying and Mapping/The Hydrographic Society of America) certified hydrographers, eTrac's projects are performed at the highest level of quality and detail that the industry demands. eTrac confirms to all local survey standards when completing all hydrographic survey work. eTrac is a holder of the California State Lands Commission Geophysical Survey Permit. eTrac's Permit number is 9235.

2. OBJECTIVES

eTrac completed a hydrographic survey covering the designated survey area. The objectives of the survey were as follows;

1) Create a bathymetry grid of seabed depths across the area
2) Position and create pipeline alignment where pipe exposed
3) Locate obstruction objects on the seabed
4) Determine the extents of rock outcroppings
5) Determine the extents of kelp beds

Other cables and obstructions may exist aside from these. Both the horizontal location, the depth and the depth of burial below the mudline will be reported for each target. From these targets, cables and pipeline routes will be determined as well as areas with obstructions to be avoided.

3. METHODOLOGY

a. Survey Vessels

All work was completed onboard survey vessel *S/V Tikaani*. *S/V Tikaani* is an aluminum monohull, hydrographic survey vessel of 24ft. *S/V Tikaani* is field proven, having conducted numerous hydrographic and geophysical surveys throughout Southern California with towed and mounted sensors. It is easily transported and can be mobilized for survey rapidly. A positioning and motion detection system was installed on the vessel with a long antenna base allowing maximum heading accuracy and better results in areas with low GNSS coverage. Tikaani had all offsets on the vessel measured while on a trailer to ensure that measurements to and from the positioning equipment are accurate to less than 3cms. The vessel is equipped with a Universal Sonar Mount (USM) for side-mounted multibeam. The multibeam system was mounted on this specially engineered side mount. This mount positions the system with 100% repeatability and allows for surveying in shallow water due to a specifically designed break away block (see Figure 2 for Tikaani specifications)

Figure 2 SV Tikaani specifications

b. Equipment

A base station was set up next to the survey area in Oceanside with a baseline no longer than 20 miles to any point in the survey area. This base was constantly logging and broadcasting correction data. The base position was set up on a known USACE benchmark referenced to Mean Lower Low Water (MLLW) in Oceanside. The system provided corrections for GLONASS and GPS satellites for optimal performance in areas where satellite could be blocked such as under the bridges. Precise positioning and motion systems as well as a high resolution multibeam sonar were installed for this project and are described below.

i. Positioning System

Applanix POS MV V5 Wavemaster

- Position Accuracies PPK: Horizontal: +/- (8 mm + 1 ppm x baseline length)3 Vertical: +/- (15 mm + 1 ppm x baseline length)
- Motion Accuracies, Roll and Pitch: 0.015° in PPK
- Heading Accuracies: 0.03° (2 m baseline)
- Real time Heave 5cms and Trueheave Solutions available increasing to 3cms
- With POSPac Processing allows PPK solution with GLONASS AND GPS satellites.

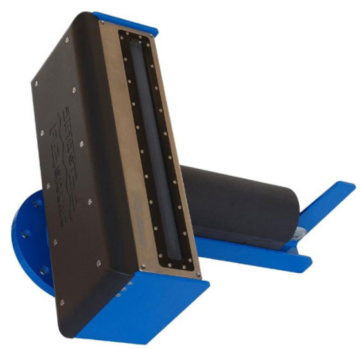
Figure 3 Applanix POS MV Oceanmaster

Trimble 5700

- Broadcasting RTK CMR+ and CMR 94 corrections
- Logging data with NetR5
- GPS and GLONASS

Figure 4 Trimble SP 5700 RTK base station set up for the project

ii. Multibeam Sonar



R2Sonic 2024 Multibeam Echo sounder

- 450 kHz
- 256 discrete 0.5° x 1.0° beams (1024 soundings with ultra high density mode implemented)
- 1 to 500 meter minimum/maximum range
- 1.25 cm range resolution

Figure 5 R2 Sonic 2024 Multibeam Echosounder System

An R2 Sonic 2024 multibeam system was used for all data. The system was run at 450khz in ultra high density mode. This allowed sounding data density to be four times that of the standard R2 sonic 2024 system. The system was run with no gates or filters to enable imagery of all potential objects in the entire water column.

For all multibeam data the sound speed both that the sonar head and through the water column was accounted for with two sound velocity probes. An AML Micro X and AML Base X were used.

c. Geodesy

i. Project Coordinates

The project coordinates used for the survey were NAD83 U.S. State Plane California Zone 6 in US Survey feet.

Spheroid Parameters

Geodetic Datum	NAD 1983 (2011) 2010.00
Ellipsoid	GRS 1980
Semi-major Axis	20925604.474 USft
Inverse Flattening (1/f)	298.257222101

Projection Parameters

Description	US State Plane California Zone 6
Unit	US survey Feet
Projection	Lambert Conic Conformal (Two Standard Parallels)
Latitude of Origin	32° 10 00.00 North
Longitude of Origin	116° 15 00.00 West
Scale Factor	1.0
Grid Easting at Origin	6561666.667
Grid Northing at Origin	1640416.667
Scale Factor at longitude of Origin	1.0

ii. Vertical Datum

The vertical datum for all work was MLLW.

iii. Horizontal and Vertical Control

The horizontal and vertical control for the project is the NGS Benchmark "Fallbrook CS_2004" NGS CORS Station P474 (see Figure 6 for location and Figure 7 for coordinates). The base station and benchmark are 18 miles from the furthest extent of the survey area. Corrections from the CORS station were applied to logged vessel data to compute a Post Processed Kinematic position and motion for the vessel. Data was reduced from ellipsoidal to orthometric height NAVD88 using Geoid 2012A. To further reduce the data from NAVD88 to MLLW a comparison between Vdatum calculations and the USACE benchmark in Oceanside labeled OS-4. The comparisons showed the Vdatum reduction from NAVD88 to MLLW was in line with a reduction of NAVD88 to MLLW at the USACE benchmark. Vdatum showed a nominal difference (less than 0.07ft) between MLLW and NAVD88 within the survey area.

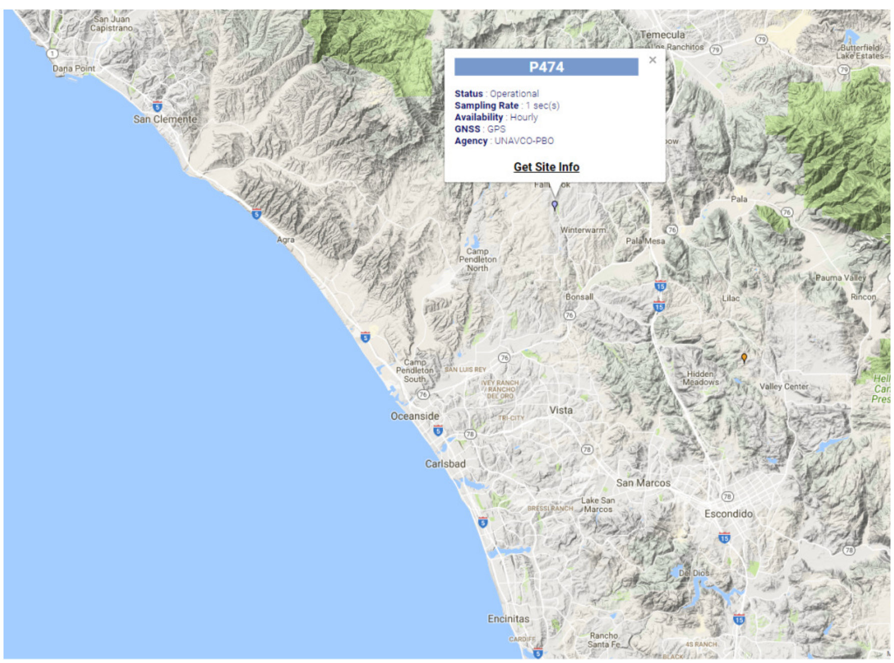


Figure 6 CORS Station P474 location

```
                    ***IGS 08***
        FALLBROOK_CS2004 (P474),  CALIFORNIA

 Created on 31Aug2011 at 09:40:52.

        Antenna Reference Point(ARP): FALLBROOK_CS2004 CORS ARP
        -------------------------------------------------------
                           PID = DG9734

 IGS08 POSITION (EPOCH 2005.0)
 Computed in Aug 2011 using data through gpswk 1631.
     X =  -2441765.277 m     latitude    =  33 21 18.69108 N
     Y =  -4741246.525 m     longitude   = 117 14 55.28448 W
     Z =   3487030.660 m     ellipsoid height =  182.909   m

 IGS08 VELOCITY
 Computed in Aug 2011 using data through gpswk 1631.
     VX =  -0.0291 m/yr      northward =   0.0167 m/yr
     VY =   0.0247 m/yr      eastward  =  -0.0372 m/yr
     VZ =   0.0143 m/yr      upward    =   0.0006 m/yr


 NAD_83 (2011) POSITION (EPOCH 2010.0)
 Transformed from IGS08 (epoch 2005.0) position in Aug 2011.
     X =  -2441764.664 m     latitude    =  33 21 18.68099 N
     Y =  -4741247.732 m     longitude   = 117 14 55.24202 W
     Z =   3487030.810 m     ellipsoid height =  183.653   m

 NAD_83 (2011) VELOCITY
 Transformed from IGS08 velocity in Aug 2011.
     VX =  -0.0141 m/yr      northward =   0.0280 m/yr
     VY =   0.0251 m/yr      eastward  =  -0.0240 m/yr
     VZ =   0.0231 m/yr      upward    =  -0.0005 m/yr
```

Figure 7 Details of point Fallbrook_CS2004 CORS Station P474

d. Acquisition and Safety

All data was collected from September 25th to 29th 2017. Data was collected in a safe and efficient manner. Data was collected in daylight hours and in calm conditions. On the 28th the survey was stopped early due to weather conditions. All personnel involved with the project are OSHA certified and at the start of the day and before any activity change a full toolbox talk was completed. The main risk involved was deploying and retrieving the sonar head. Two people were always on deck during these operations and retrieval and it was always done at periods during which ample time could be allowed for the process to be done in a safe manner. Where the conditions were optimal the survey was run to shore up to the point where there was only 1m (~3.2ft) clearance below the sonar head. Where there were rock outcroppings and boulders noted or in areas of surf, 2m (~6.4ft) clearance below the sonar was considered the shallowest depths the vessel would work in. The minimum depth achieved was 1ft below MLLW. All data collected was at least 8ft below MLLW.

e. Processing & Software

All multibeam data acquisition was completed in QPS QINSy hydrographic data acquisition, navigation and processing software package. Fixed RTK data was quality controlled online using a real time standard deviation error grid. Change in the sound speed environment were monitored and appropriate actions in terms of further measuring of the water column sound speed were taken. Position data was post processed in Applanix POS Pac Inertial post position processing software. This allowed the creation of a more accurate and robust Smoothed Best Estimate of Trajectory (SBET) solution. This was especially useful under the bridge during periods of GNSS outage. This refined, highly accurate post processed position and motion was applied to the multibeam data in QPS QIMERA software. Data was then analyzed, further processed for positional errors and cleaned in QIMERA.

f. Analysis

The multibeam data was analyzed as both 3D gridded surfaces and 3D point cloud visualization environments. This allowed a detailed understanding of the feature geometries. This data was interpreted in order to determine the existence of debris objects, rocks, rock outcroppings, and kelp beds.

Debris objects were determined as features that were anomalous to the surrounding seabed. Anything that protruded from the seabed or created a relief that was not in common with the prevailing bathymetry in the area. A further distinction of being a debris object as opposed to a rock or boulder was made based on the geometry of the feature. A rounded, smaller (less than 5ft wide or long), singular feature was considered a rock or boulder. An irregular shaped feature (a linear feature, non circular or rectangular feature) was considered a debris object.

The extents of rock outcroppings were determined by looking for a change in rugosity as compared to the surrounding sand or mud environment. A rock outcropping was assumed to be an area with high rugosity distinct from smooth sand or mud. The intensity or the acoustic reflectance was also analyzed to confirm the delineation of rock outcroppings.

Kelp beds were determined by the existence of kelp stalks which cause large amounts of disturbance in the sonar data in the water column. The extents of the kelp beds were determined by the identification of these stalks in the sonar data with the understanding that the kelp leaves at the surface could extend further out from the stalks.

The pipeline alignment was analyzed by using a shallow gridded surface and 3D point cloud. The top of the pipe was considered the shallowest point across the pipeline as detected in the multibeam sonar data.

g. Geodatabase

A geodatabase was made to store all the findings. These are referenced by year and type of object or cable found in order that if there are any further developments change can be noted. Each feature is given a unique id code. Where the cable or pipe name was used this was included with the year of survey and client surveyed for see Figure 8.

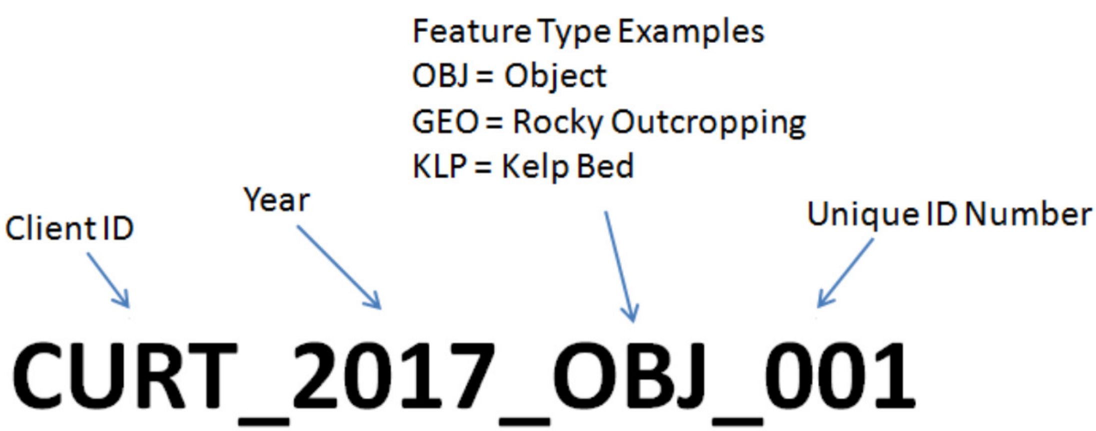


Figure 8 Geodatabase Unique IDs

4. RESULTS

a. Multibeam

200% multibeam coverage was achieved in entire survey area. All the position data was successfully post processed so that up to 100% of the data was post processed kinematic where accuracies of 0.1ft were achieved.

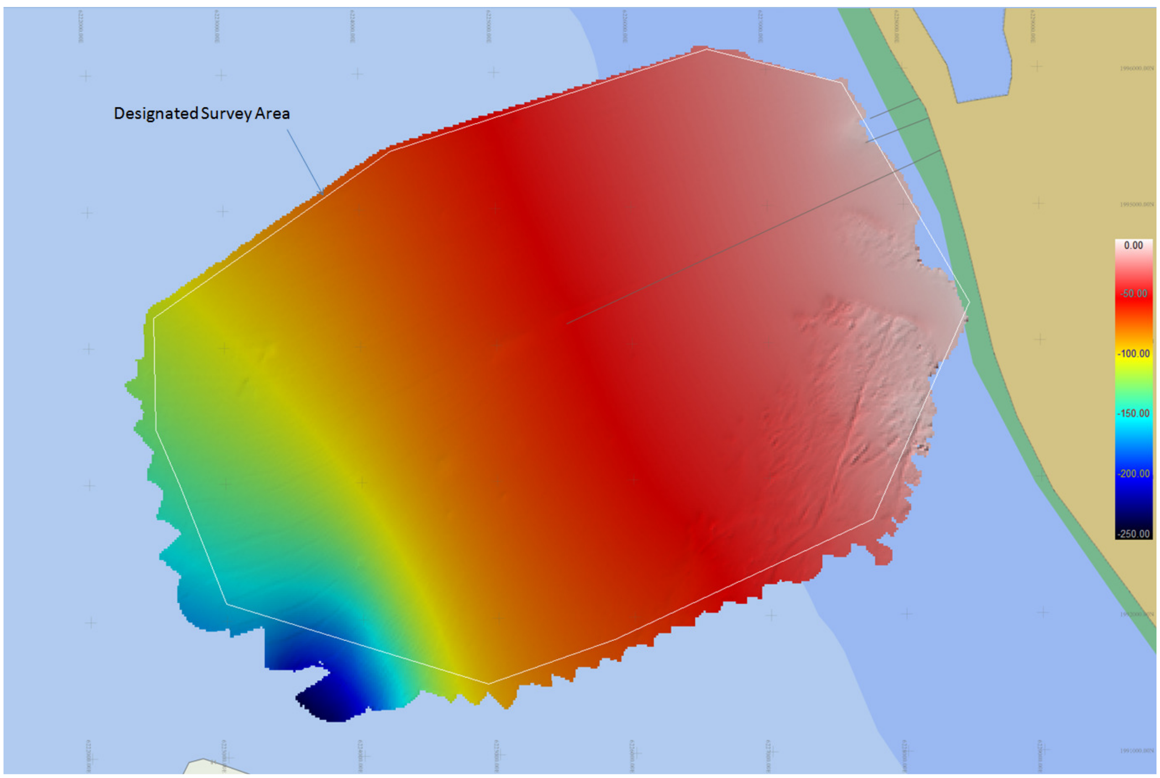


Figure 9 Multibeam coverage

b. Overview

The pipeline was clearly able to be identified when exposed above the seabed. The point definition on the pipeline was such that the top of the pipe was able to be determined for an accurate determination of alignment. Figure 10 shows the pipeline in the sounding data and the gridded data.

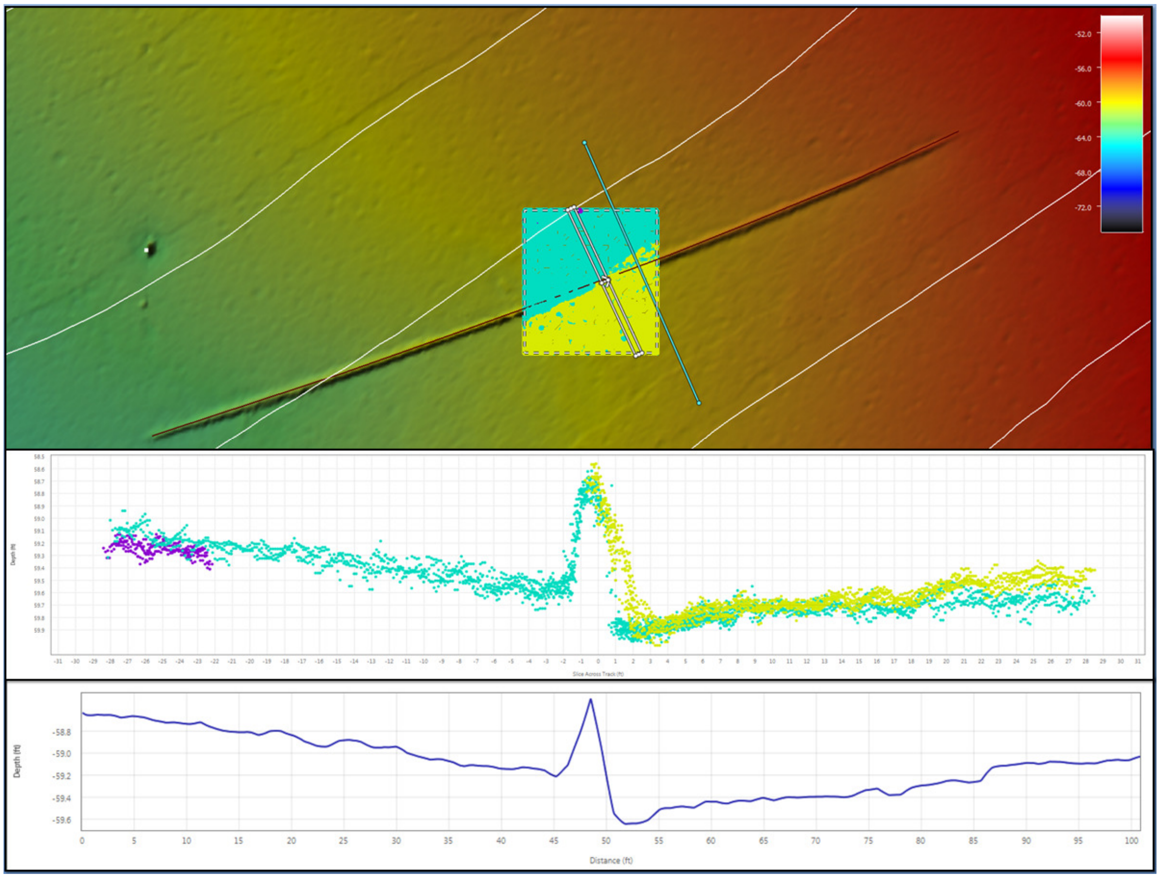


Figure 10 Pipeline as visible in the gridded multibeam data, profile data and 2D slide of sounding data

Data resolution and density was such that objects 6ft wide were detected past 100ft. The smallest note worthy object detected was 4x3x1ft. Rocks with diameters of 3ft were detected down to 170ft (see Figure 11).

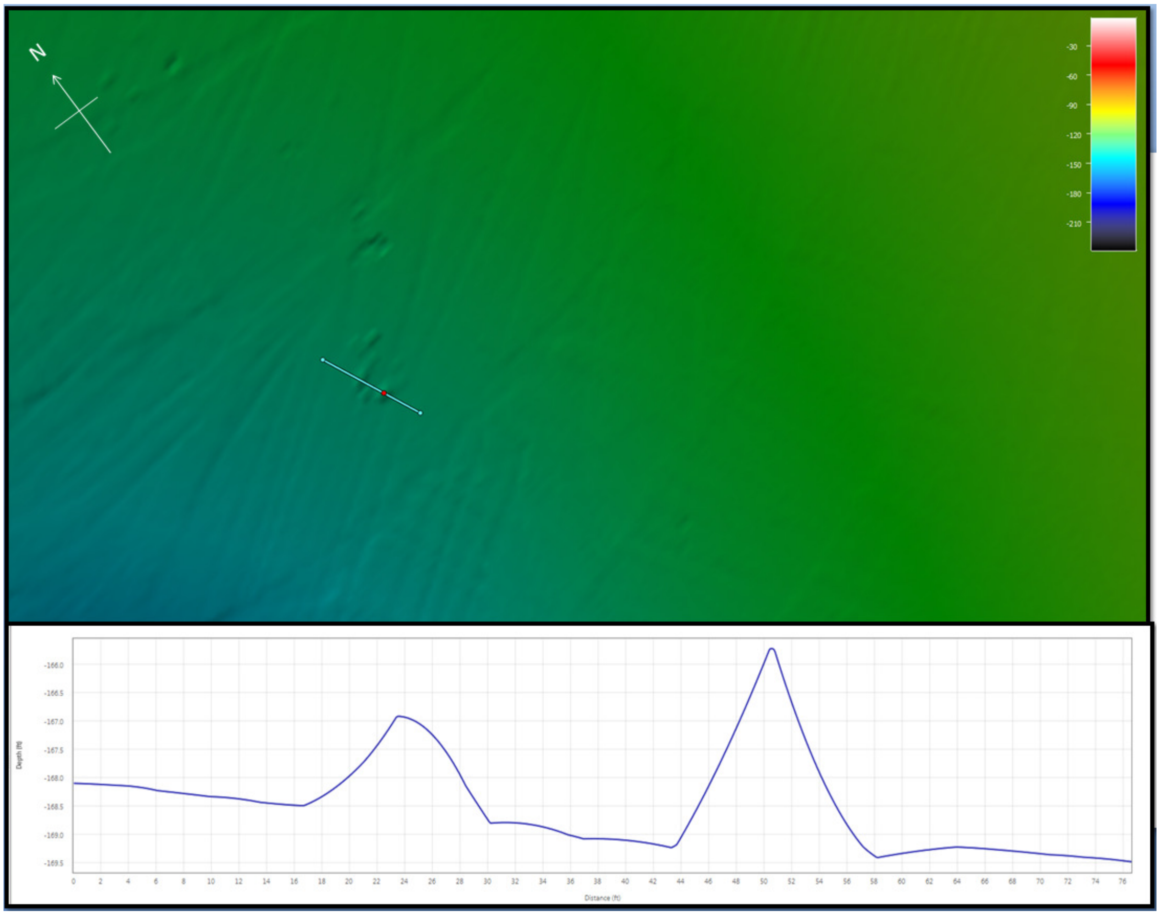


Figure 11 Rock objects at 168ft depth

Rock outcroppings were well defined in the multibeam data and evident and distinctly different to the surrounding sand. This allowed extents to be accurately located. Rock outcroppings viewed in a 3D gridded surface colored by depth and colored by rugosity is shown below in Figure 12.

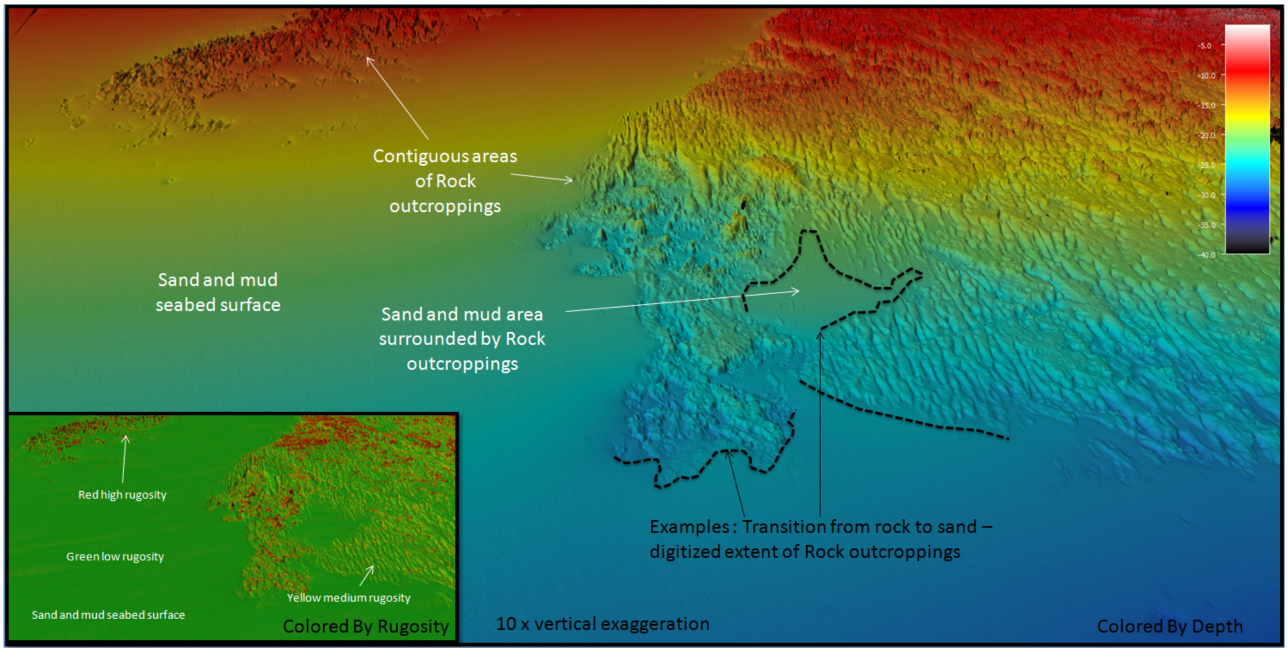


Figure 12 Rock outcroppings in 3D gridded surface colored by depth and colored by rugosity

The disturbance of kelp stalks was clear in the sonar data allowing accurate depiction of the kelp bed extents. The kelp stalks as detected in sonar data above rock outcroppings is shown below in Figure 13.

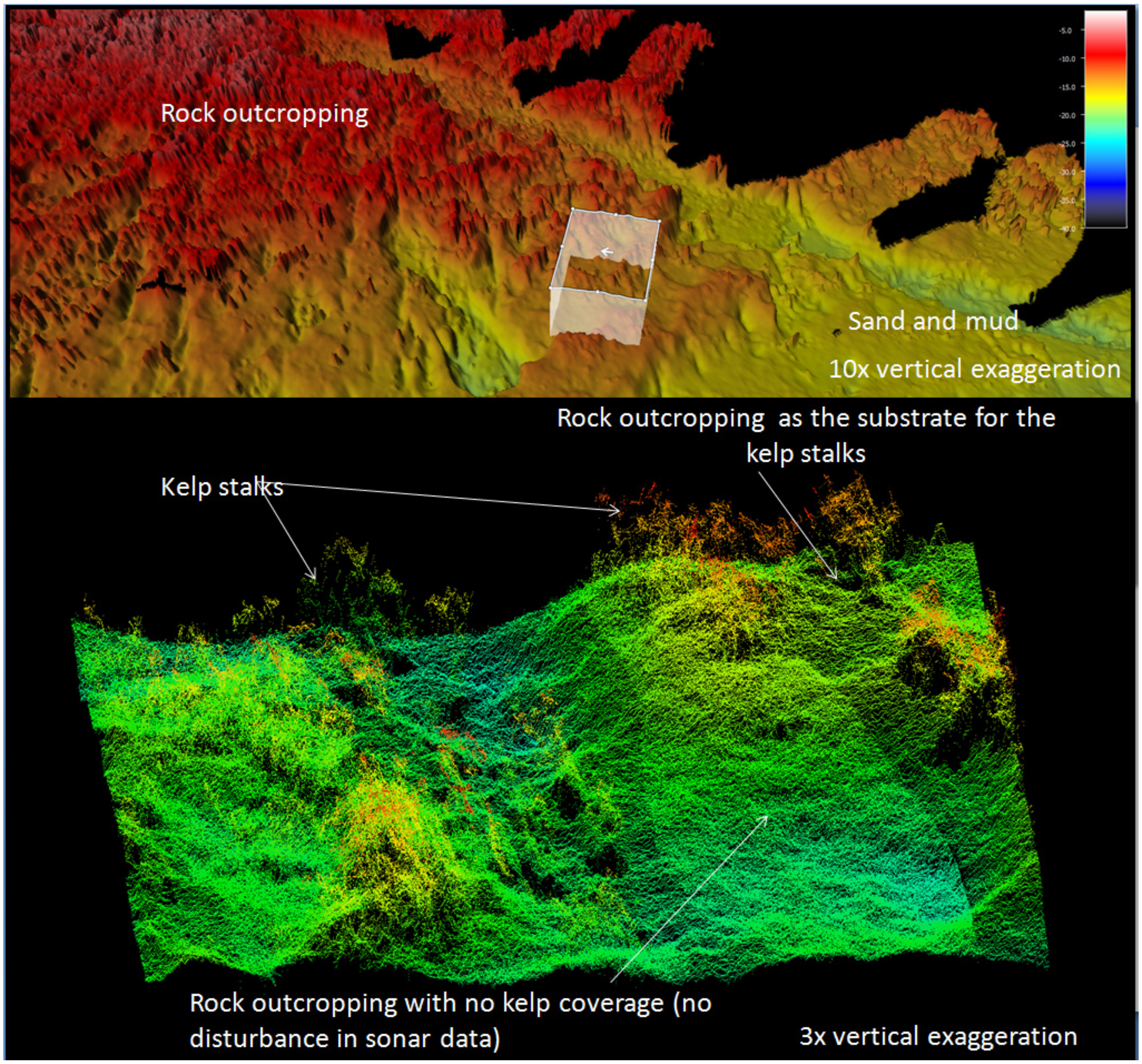


Figure 13 Kelp stalks as detected in the sonar data as disturbance above rock outcroppings

5. ANALYSIS

This section will describe the As Surveyed positions of surface objects, the charted cables each dealt with separately and then the uncharted utilities located across the survey area.

a. Pipeline Alignment

The pipeline was observed as being exposed for 1098ft. There are eight (8) exposure sections ranging from 8ft to 421ft. As the pipeline transitions from sea to land the pipe was mapped up to the shallowest point. The pipeline is exposed during this transition from water to land. These sections are shown below in Figure 14.

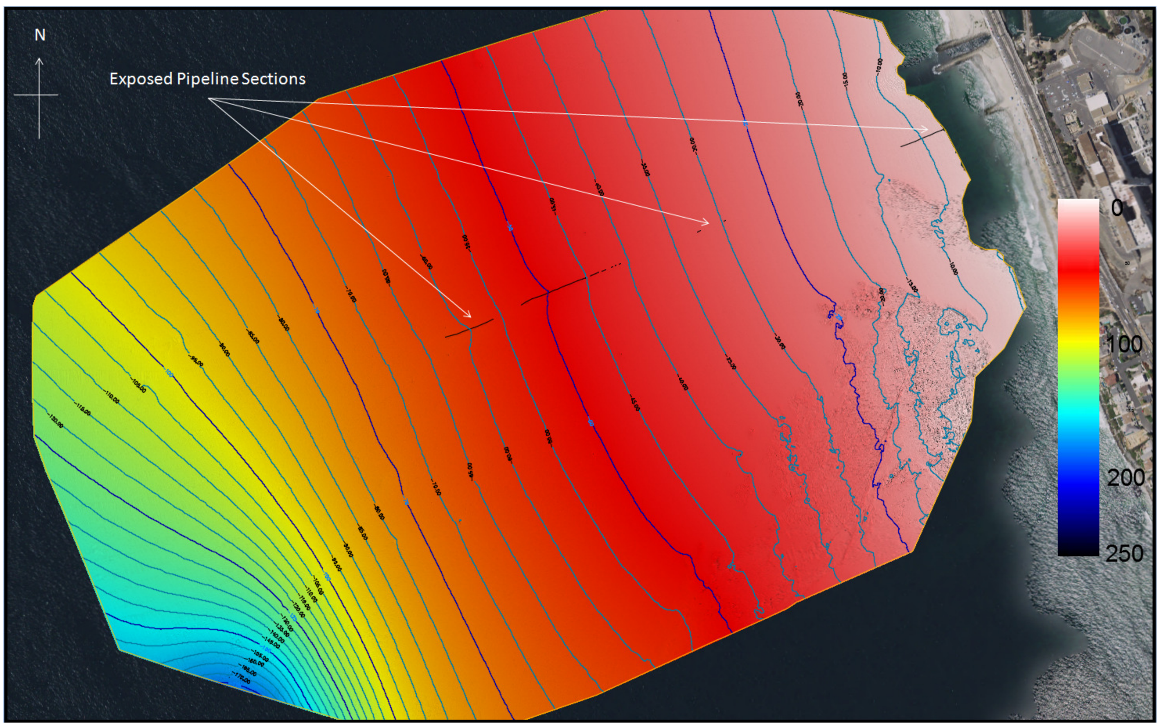


Figure 14 Pipeline exposure sections

During the transition from water to land the pipeline is exposed and further exposure sections are offshore. The pipeline is not fully exposed. Only part of the pipeline was visible above the surface. The pipeline, as seen in the multibeam data as a 3D point cloud is shown in Figure 15 below. The pipeline in the transition zone is shown in Figure 16. The curved geometry of the pipeline is evident which allows the determination that the pipeline is not fully exposed.

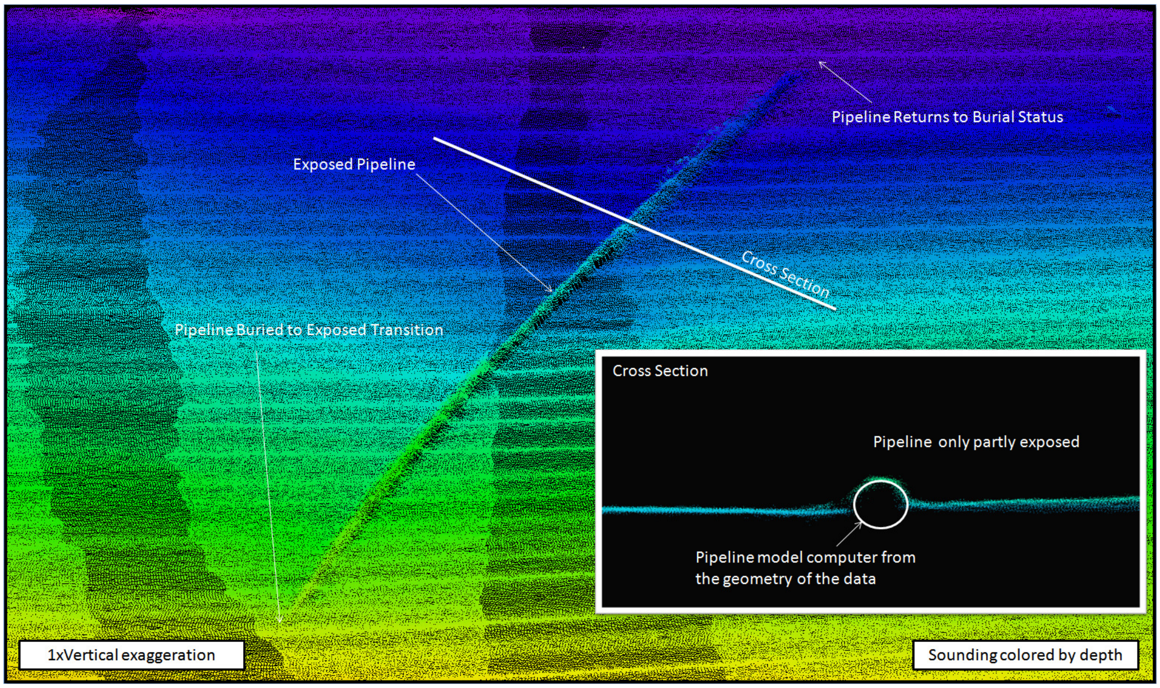


Figure 15 The pipeline in 3D point cloud data

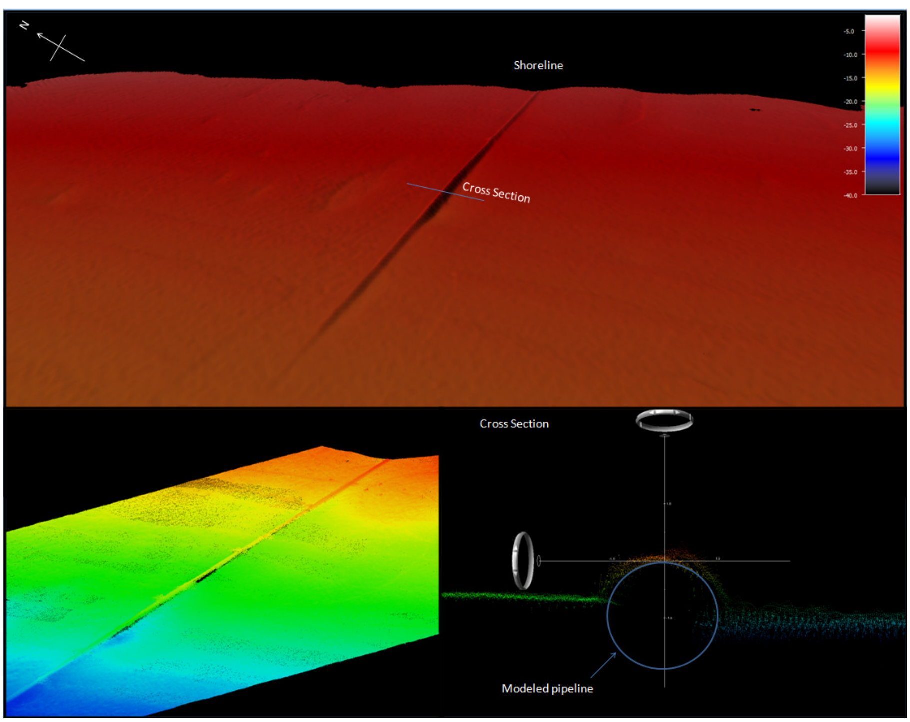


Figure 16 Pipeline in transition zone from water to land

In small areas the bathymetry resembles a pipe line trench or scouring. This is directly in line with and adjacent to the exposure sections. These trench feature lead from one exposure section to another. Therefore, these could be used as evidence of the horizontal alignment of the pipeline where buried.

These trench evidence sections are shown below in Figure 17 and Figure 18.

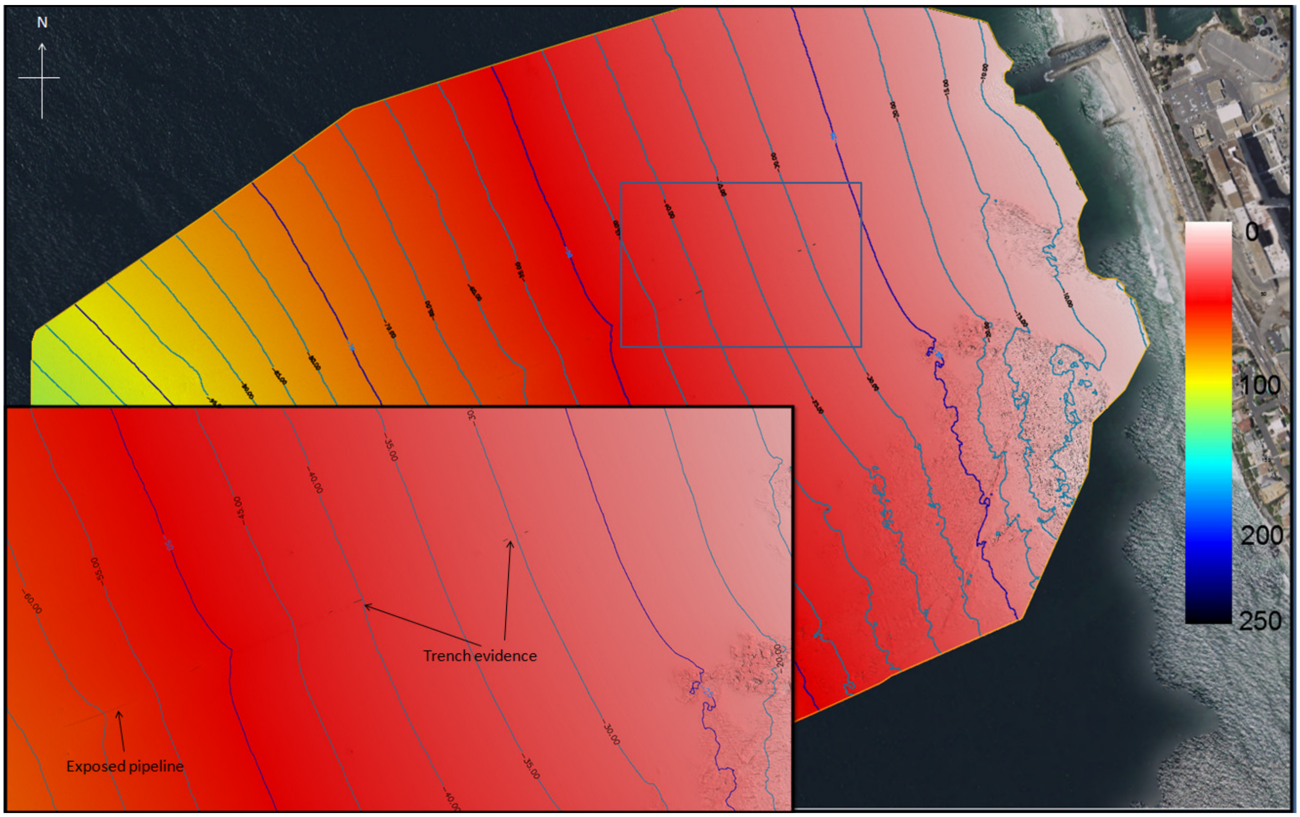


Figure 17 Trench evidence sections

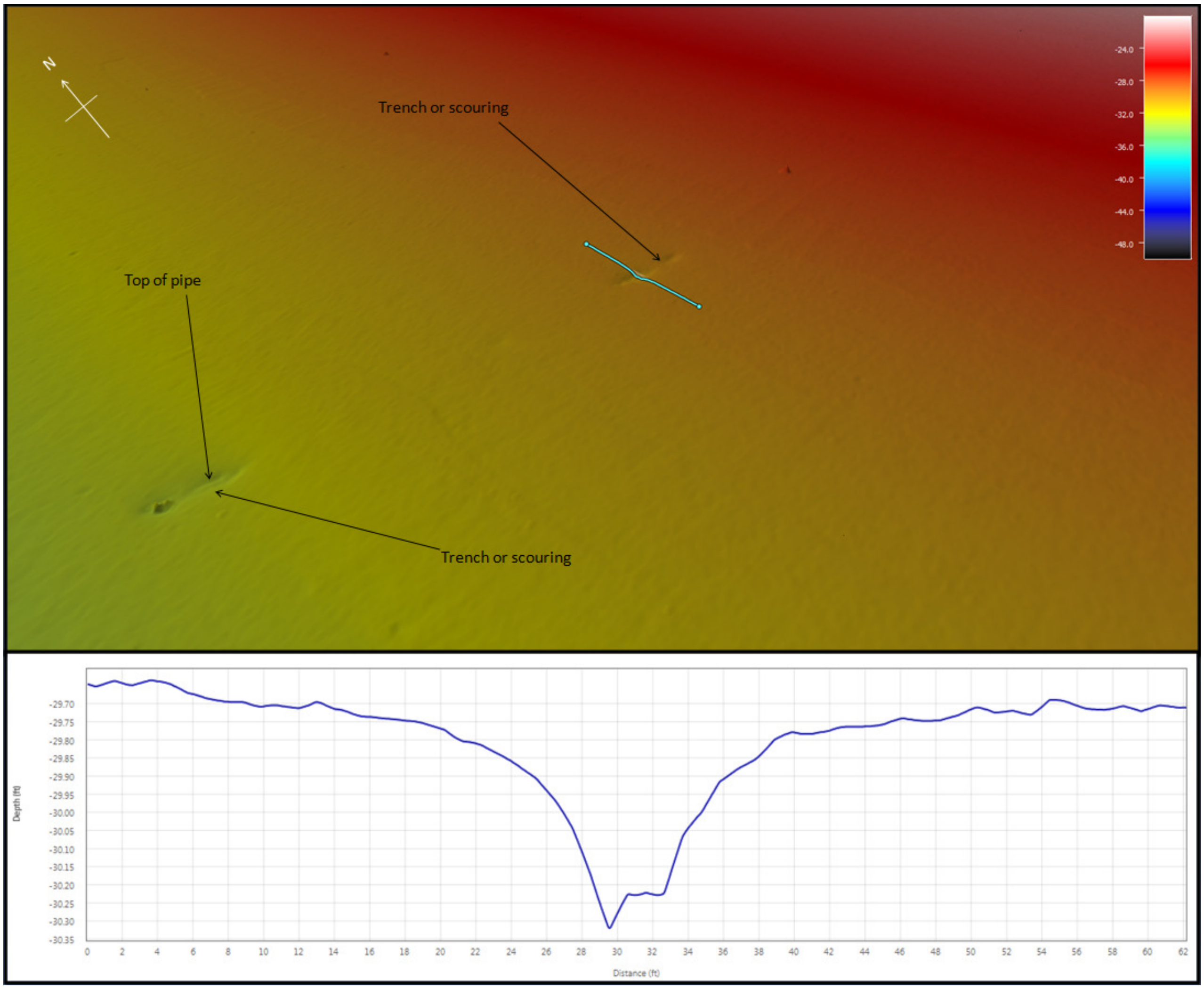


Figure 18 Trench evidence area with profile

b. Debris Objects

Seventeen (17) debris objects were located in the survey area. These range from 10ft long to only 4ft. A comparison and correlation of the location of the debris objects, with the position of tanker berth mooring buoys and pipeline end anchors as located in the drawing 12-011-D-01 rev 4 drawn by Longitude 123, inc on October 2nd 2013, suggested that the debris objects were possible anchors. Table 1 below lists the debris objects located. The details column shows that many of the objects are possible anchors due to their correlating position with that shown in plot as well as the feature geometry.

Table 1 Debris Objects in survey area

		US State Plane California Zone 6 USft		NAD 83 (2011) 2010.00		Usft Below MLLW	USft
Unique ID	Description	Easting	Northing	Latitude	Longitude	Minimum Depth	Dimensions (WxLxH)
CURT_2017_OBJ_001	Possible Tanker berth mooring anchor and chain	6226009.1	1993904.6	33;07;59.99364 N	117;20;47.30508 W	42.1	8x4x1
CURT_2017_OBJ_002	Submarine pipeline end anchor	6224948.4	1994062.7	33;08;01.44778 N	117;20;59.79706 W	59.8	6x4x1
CURT_2017_OBJ_003	Unknown spherical object/Possible Single Point Mooring	6223113.1	1993648.8	33;07;57.16034 N	117;21;21.32680 W	105.6	6x6x0.5
CURT_2017_OBJ_004	Unknown spherical object/Possible Single Point Mooring	6223151.1	1993942.5	33;08;00.07042 N	117;21;20.91735 W	99.1	6x5x0.5
CURT_2017_OBJ_005	Unknown spherical object/Possible Single Point Mooring	6223069.2	1993934.3	33;07;59.98028 N	117;21;21.87918 W	102.3	6x5x0.5
CURT_2017_OBJ_006	Unknown spherical object/Possible Single Point Mooring	6223208.2	1994004.3	33;08;00.68803 N	117;21;20.25313 W	97.5	5x5x0.5
CURT_2017_OBJ_007	Possible Tanker berth mooring anchor (no chain evident)	6225793.0	1994632.5	33;08;07.17305 N	117;20;49.93668 W	41.3	8x4x1
CURT_2017_OBJ_008	Possible Tanker berth mooring anchor and chain	6226843.7	1994570.9	33;08;06.67256 N	117;20;37.57295 W	25.8	6x4x1
CURT_2017_OBJ_009	Submarine pipeline end anchor (additional associated object 15ft from main anchor)	6224967.6	1993902.2	33;07;59.86209 N	117;20;59.55180 W	60.8	6x4x1
CURT_2017_OBJ_010	Possible Tanker berth mooring anchor and chain	6225036.6	1992893.2	33;07;49.88605 N	117;20;58.61538 W	66.7	12x5x2
CURT_2017_OBJ_011	Large vessel anchor or tanker berth mooring anchor	6224613.8	1994973.6	33;08;10.42462 N	117;21;03.84470 W	58.2	11x5x2
CURT_2017_OBJ_012	Unknown spherical object	6226736.6	1994754.5	33;08;08.47797 N	117;20;38.85499 W	12.6	4x3x1
CURT_2017_OBJ_013	Possible Tanker berth mooring anchor (no chain evident)	6225027.0	1994849.3	33;08;09.23824 N	117;20;58.97084 W	52.7	4x4x1
CURT_2017_OBJ_014	Unknown rectangular object	6225649.0	1994609.1	33;08;06.92672 N	117;20;51.62636 W	43.9	4x2x1
CURT_2017_OBJ_015	Possible Tanker berth mooring anchor (no chain evident)	6225834.2	1993298.9	33;07;53.98310 N	117;20;49.28709 W	49.4	10x3x1
CURT_2017_OBJ_016	Possible Tanker berth mooring anchor and chain	6224633.6	1992770.9	33;07;48.63443 N	117;21;03.33840 W	77.9	6x4x1
CURT_2017_OBJ_017	Linear object/Possible Chain	6223285.6	1993927.8	33;07;59.93869 N	117;21;19.33358 W	97.5	10x0.5x0.3

Below in Figure 19 the location of all the objects relative to the pipeline can be seen. Figure 20 shows an image of drawing 122-011-D-01 rev 4 with mooring and pipeline anchors for comparison.

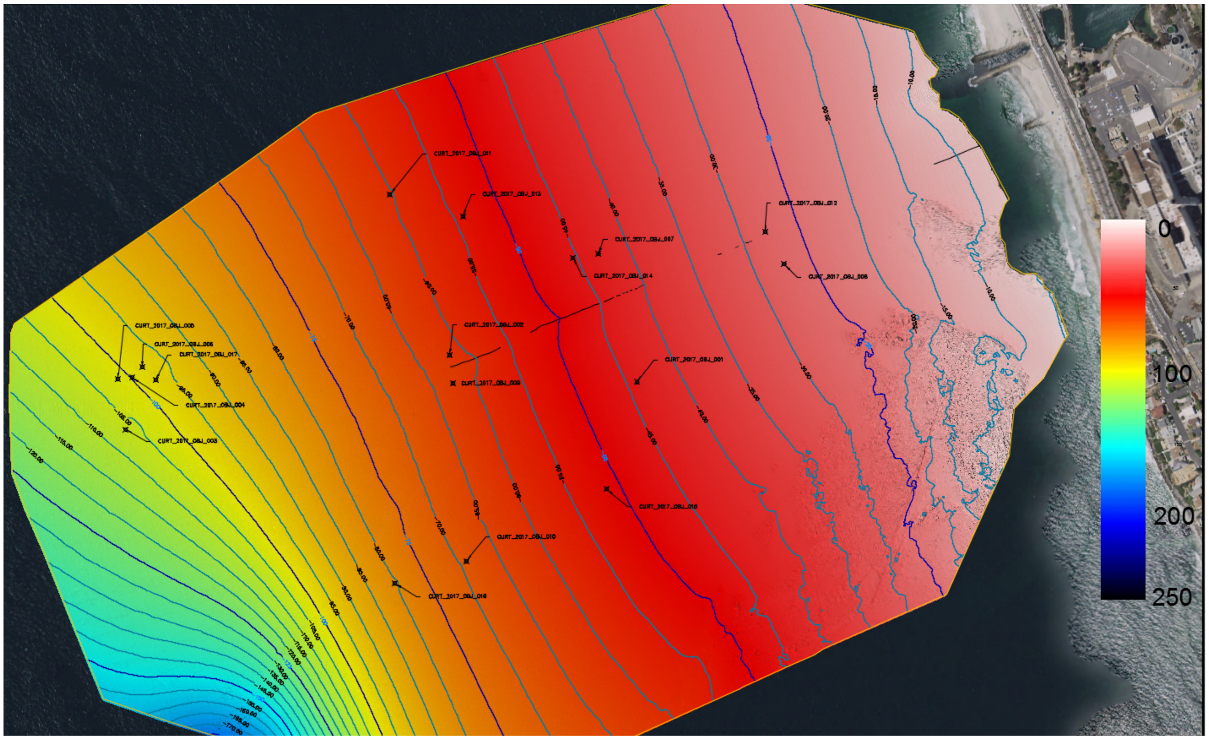


Figure 19 Location of debris objects in the survey area

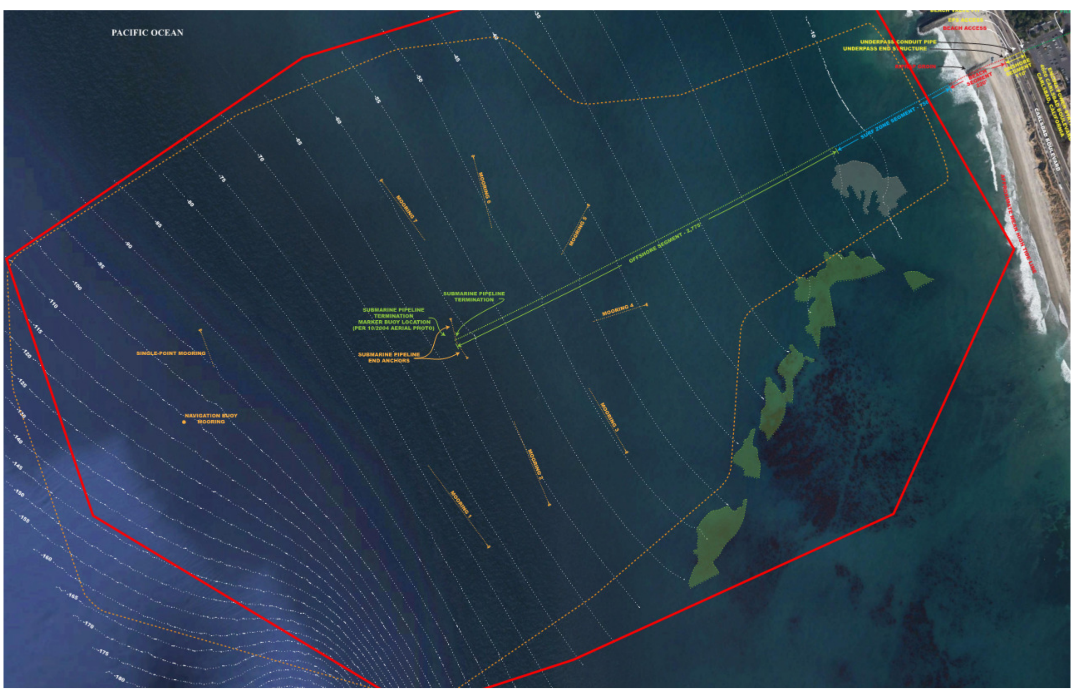
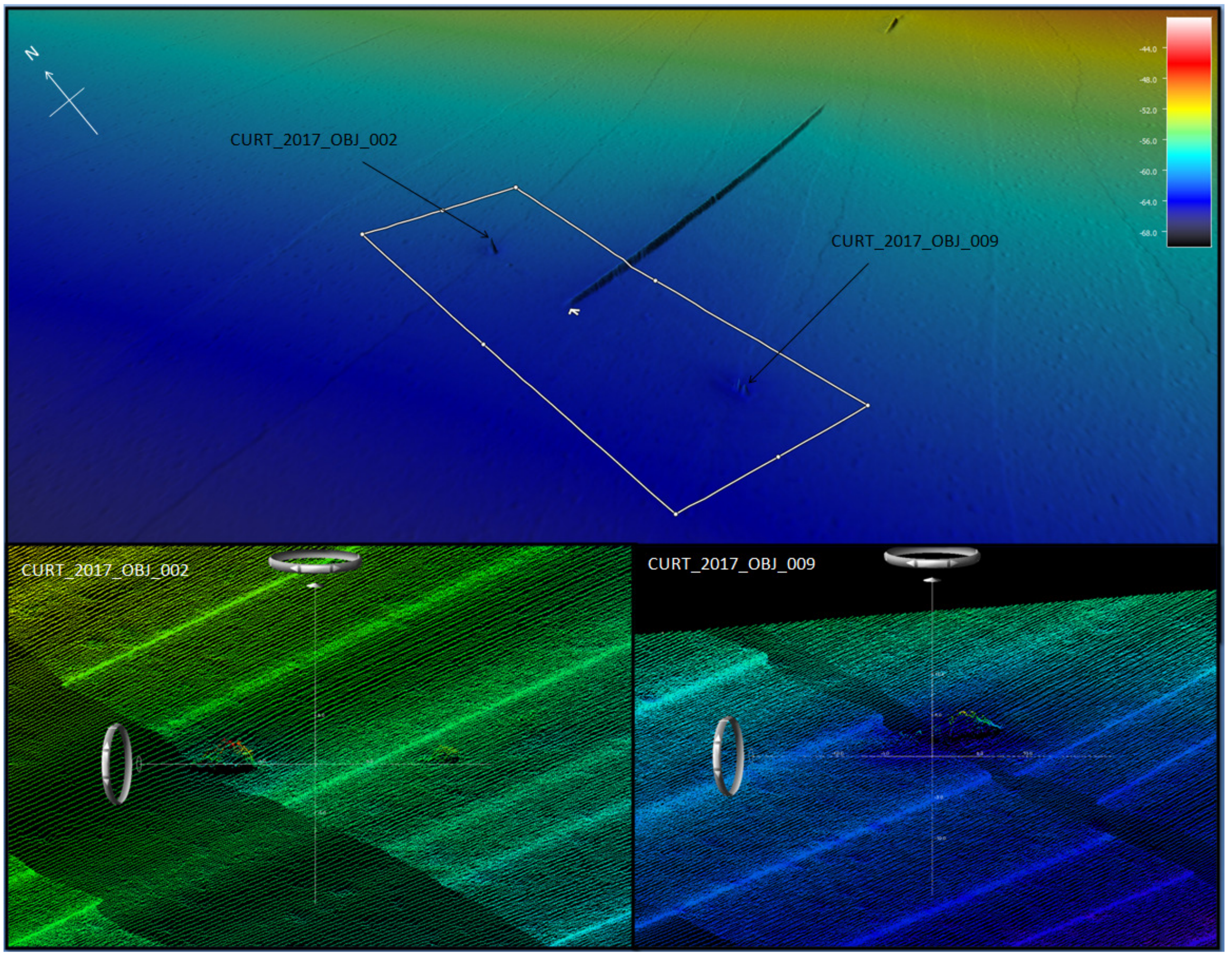


Figure 20 Image from the drawing 12-011-D-01 rev 4 showing mooring and pipeline anchors

Two (2) debris objects (CURT_2017_OBJ_002 and 009) at the end of the pipeline correlate well with the pipeline anchors. They are both a similar size with dimensions 6ft width, 4ft width and 1ft height above the seabed.



Two (2) other debris features that appear to be anchors are CURT_2017_OBJ_010 and CURT_2017_OBJ_011. These are shown below in Figure 21and Figure 22.

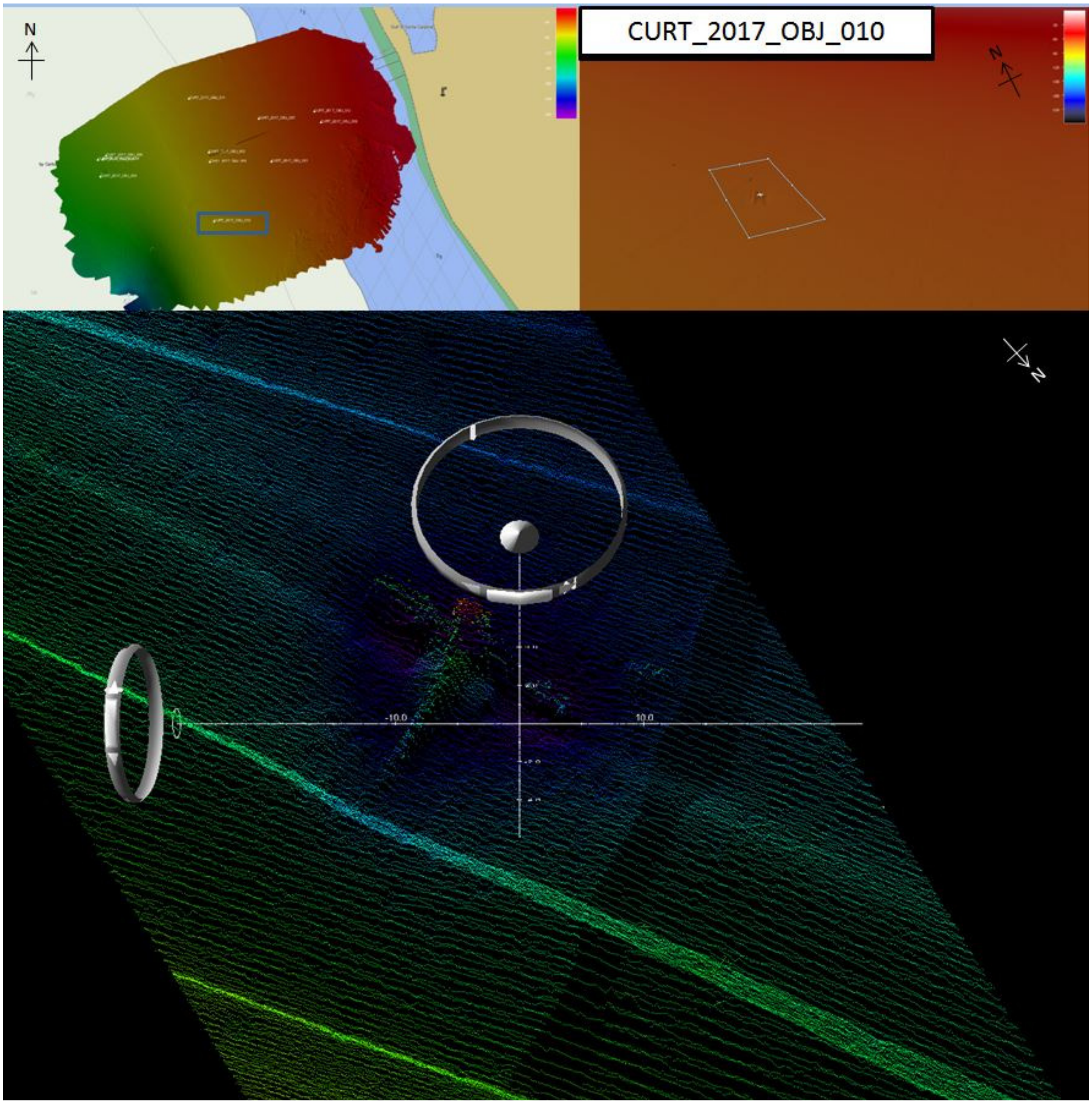


Figure 21 CURT_2017_OBJ_010 Anchor Object

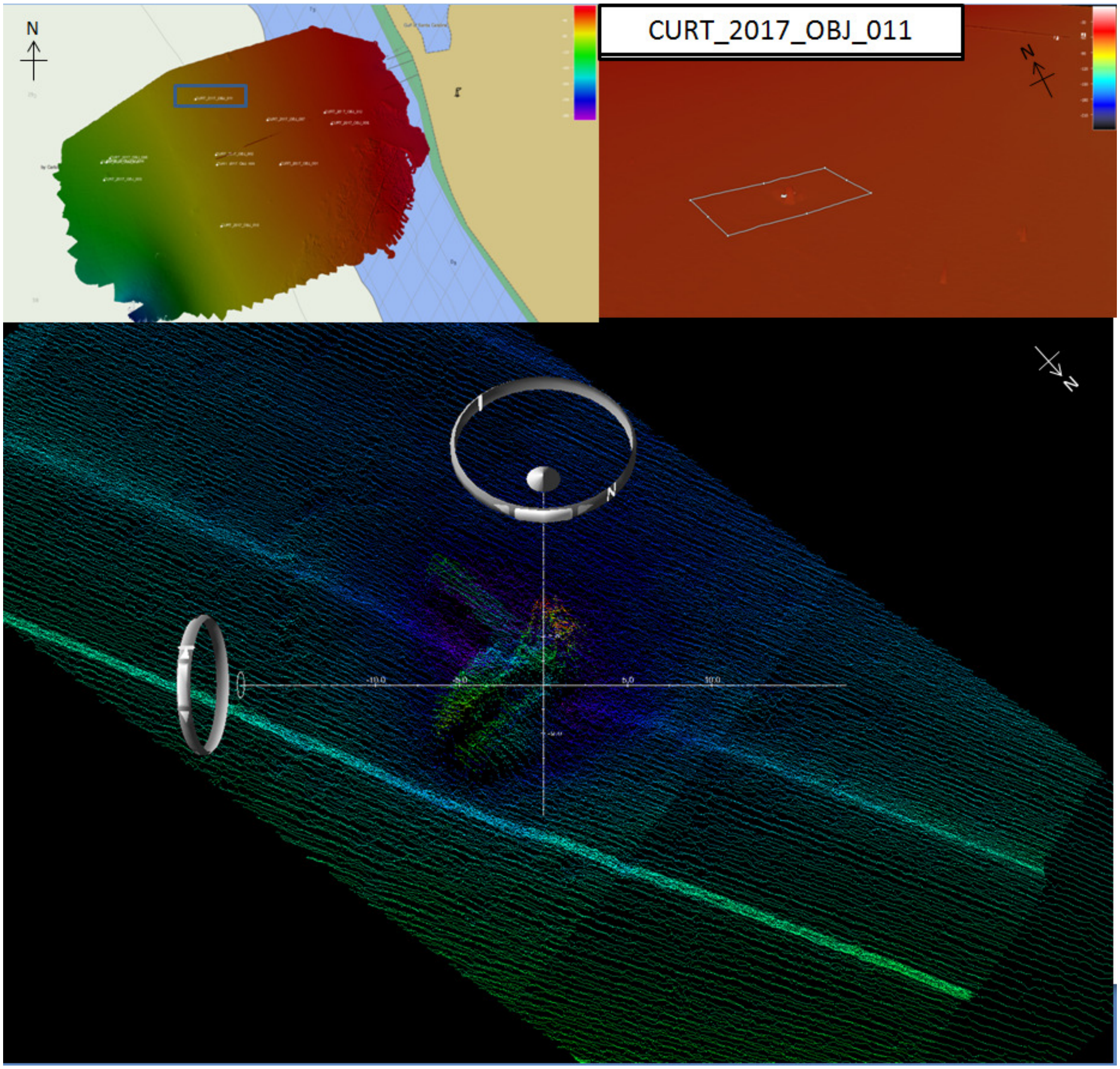


Figure 22 CURT_2017_OBJ_011 Anchor Object

One larger object that does not appear to correlate with any anchor potions or resemble the shape of an anchor is CURT_2017_OBJ_017. This appears to be a chain object or linear feature (see Figure 23).

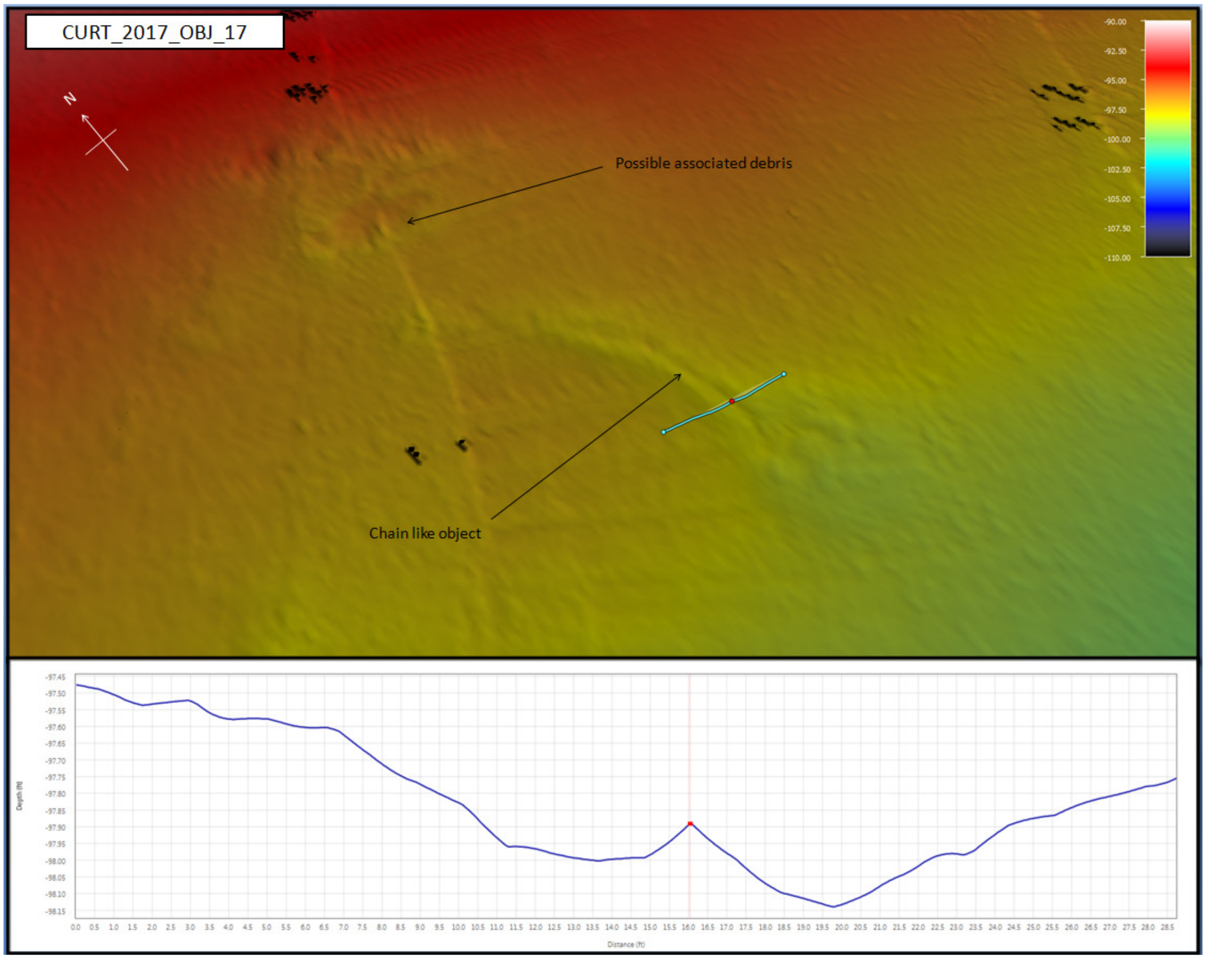


Figure 23 CURT_2017_OBJ_017 a linear feature or chain

The location of two (2) objects, CURT_2017_OBJ_012 and CURT_2017_OBJ_018 did not correlate to any of the mooring or pipeline anchors. However, their position either side of the pipeline and shape (including evidence of an attached line) suggested these could be anchors or pipeline associated infrastructure (see Figure 24).

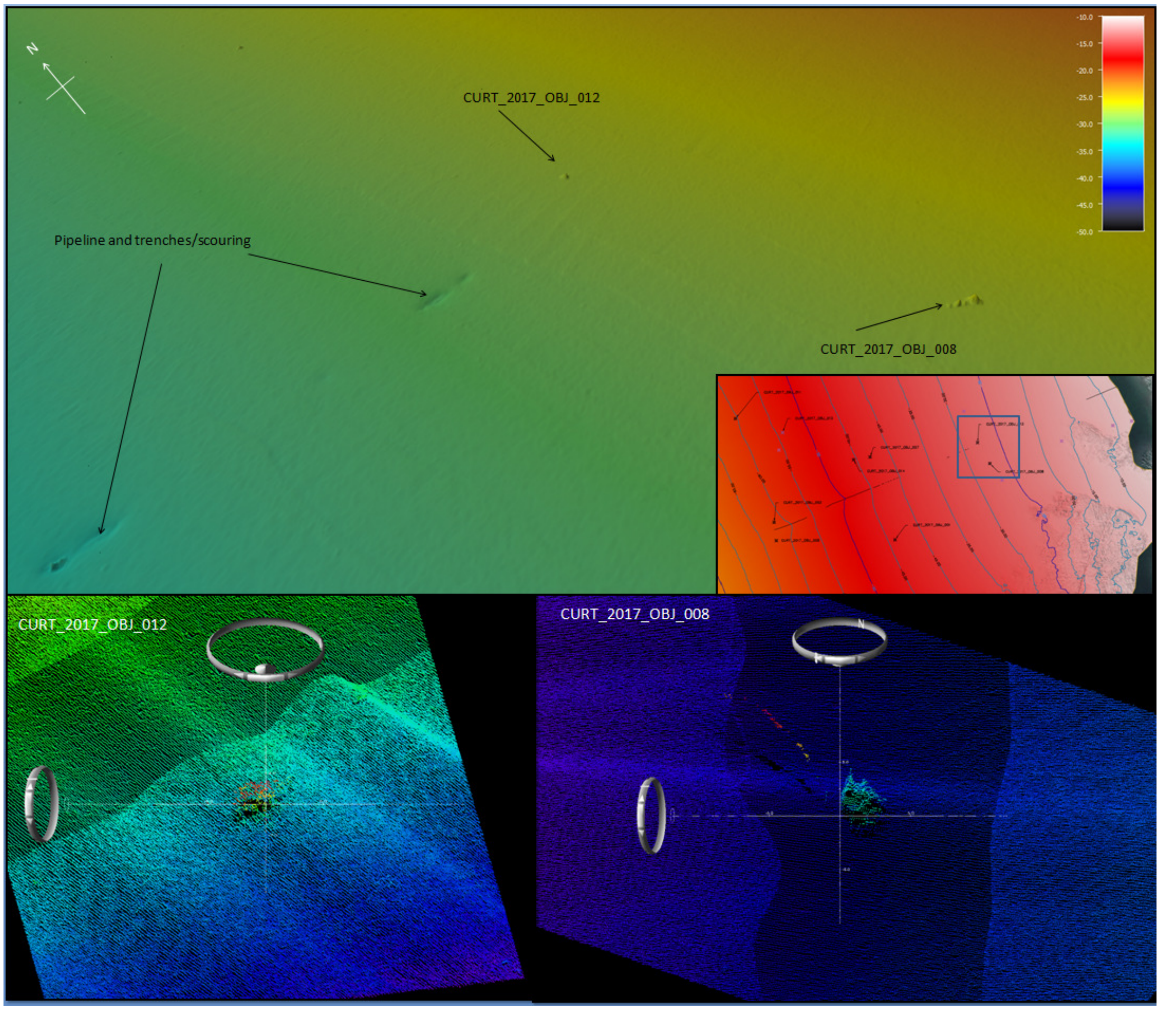


Figure 24 CURT_2017_OBJ_008 and 012 possible anchors due to shape and attached line

c. Rocks/Boulders

Thirty-two (32) rocks or boulders were located across the survey area. These are listed with unique IDs in Table 2. Sporadic, isolated rocks were located across the survey area. Several rocks were adjacent to the rock outcroppings in the south east of the survey area. The map in Figure 25 shows the location of the rocks across the survey area.

Table 2 Rock/Boulder objects in survey area

	US State Plane California Zone 6 USft		NAD 83 (2011) 2010.00	
Unique ID	Easting	Northing	Latitude	Longitude
CURT_2017_ROCK_001	6224863.0	1993013.7	33;07;51.06034 N	117;21;00.67156 W
CURT_2017_ROCK_002	6224135.9	1992706.5	33;07;47.94505 N	117;21;09.18312 W
CURT_2017_ROCK_003	6224073.3	1992894.5	33;07;49.79849 N	117;21;09.94259 W
CURT_2017_ROCK_004	6226617.5	1995029.4	33;08;11.18552 N	117;20;40.28970 W
CURT_2017_ROCK_005	6226355.9	1995905.8	33;08;19.82907 N	117;20;43.47426 W
CURT_2017_ROCK_006	6226440.1	1995735.6	33;08;18.15393 N	117;20;42.46306 W
CURT_2017_ROCK_007	6225027.0	1994849.3	33;08;09.23810 N	117;20;58.97079 W
CURT_2017_ROCK_008	6224993.5	1994696.2	33;08;07.71990 N	117;20;59.34574 W
CURT_2017_ROCK_009	6223957.8	1993098.4	33;07;51.80370 N	117;21;11.32608 W
CURT_2017_ROCK_010	6226287.5	1992289.6	33;07;44.04480 N	117;20;43.83180 W
CURT_2017_ROCK_011	6226481.9	1992652.4	33;07;47.65440 N	117;20;41.59075 W
CURT_2017_ROCK_012	6226595.6	1992729.0	33;07;48.42406 N	117;20;40.26326 W
CURT_2017_ROCK_013	6226594.2	1992722.2	33;07;48.35664 N	117;20;40.27888 W
CURT_2017_ROCK_014	6226602.4	1992715.3	33;07;48.28922 N	117;20;40.18161 W
CURT_2017_ROCK_015	6226415.5	1992657.2	33;07;47.69499 N	117;20;42.37212 W
CURT_2017_ROCK_016	6226426.5	1992658.5	33;07;47.70899 N	117;20;42.24293 W
CURT_2017_ROCK_017	6226382.0	1992744.1	33;07;48.55126 N	117;20;42.77676 W
CURT_2017_ROCK_018	6226676.6	1993050.3	33;07;51.61127 N	117;20;39.35046 W
CURT_2017_ROCK_019	6226675.7	1993294.2	33;07;54.02423 N	117;20;39.39114 W
CURT_2017_ROCK_020	6227719.0	1995487.5	33;08;15.83198 N	117;20;27.39301 W
CURT_2017_ROCK_021	6227724.1	1995491.5	33;08;15.87208 N	117;20;27.33353 W
CURT_2017_ROCK_022	6227714.4	1995498.7	33;08;15.94231 N	117;20;27.44848 W
CURT_2017_ROCK_023	6223840.9	1993309.5	33;07;53.87999 N	117;21;12.72695 W
CURT_2017_ROCK_024	6223732.1	1993445.9	33;07;55.21808 N	117;21;14.02329 W
CURT_2017_ROCK_025	6227474.6	1994765.0	33;08;08.65856 N	117;20;30.17810 W
CURT_2017_ROCK_026	6227924.0	1994898.9	33;08;10.02984 N	117;20;24.90990 W
CURT_2017_ROCK_027	6228090.0	1994937.4	33;08;10.42791 N	117;20;22.96257 W
CURT_2017_ROCK_028	6226949.9	1994423.3	33;08;05.22353 N	117;20;36.30611 W
CURT_2017_ROCK_029	6223638.5	1991961.1	33;07;40.51830 N	117;21;14.93902 W
CURT_2017_ROCK_030	6226676.4	1993293.6	33;07;54.01836 N	117;20;39.38284 W
CURT_2017_ROCK_031	6223841.9	1993308.9	33;07;53.87416 N	117;21;12.71511 W
CURT_2017_ROCK_032	6223878.3	1993341.0	33;07;54.19556 N	117;21;12.29109 W

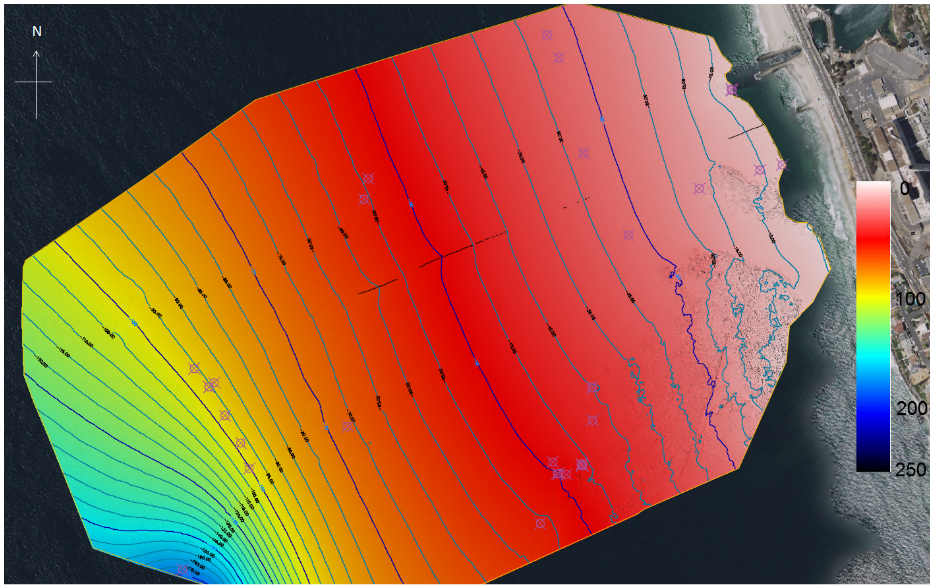


Figure 25 Location of the 32 rocks in the survey area

The rock objects were all similar dimensions (4-6ft diameter). An example of a rock in the survey area is below.

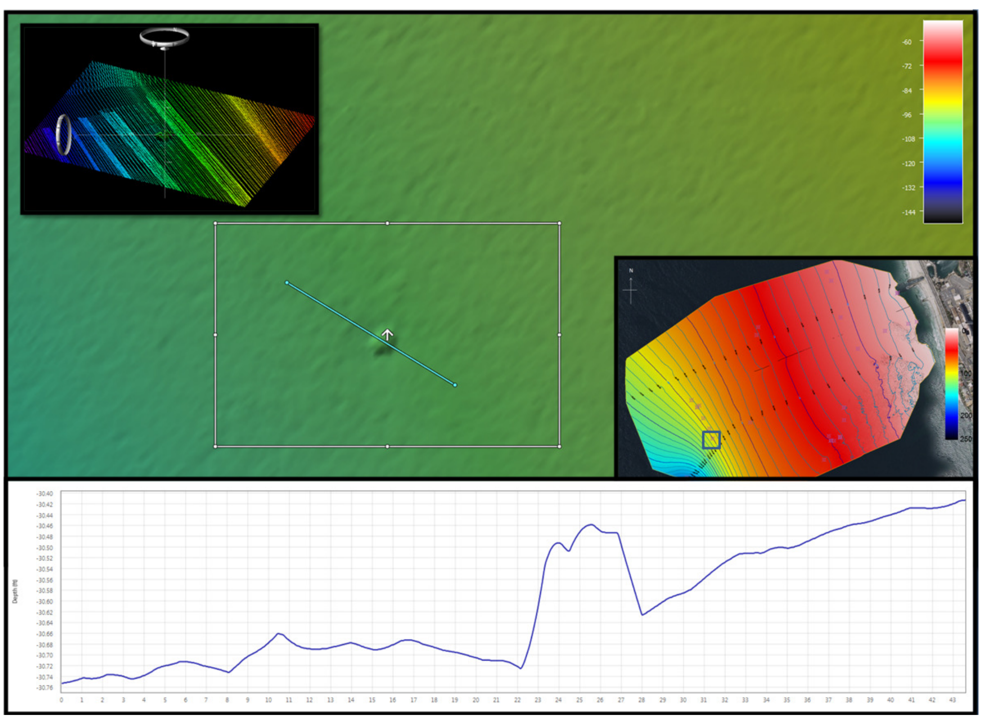


Figure 26 Rock objects

d. Rock Outcropping

Rock outcroppings are located in two main areas. There is one large contiguous area of rock outcropping to the south and south west. This area covers 44 acres up to survey boundary (The area could extend further outside the survey boundary and to shore). Then there is a smaller area to the west. This is 3.3 acres in the survey area (The area could extend further outside the survey boundary and to shore). Smaller rock outcropping areas were identified adjacent to and less than 250ft from the larger areas. These were between 0.01 acres and 0.05 acres. The map below in Figure 27 shows these rock outcropping areas.

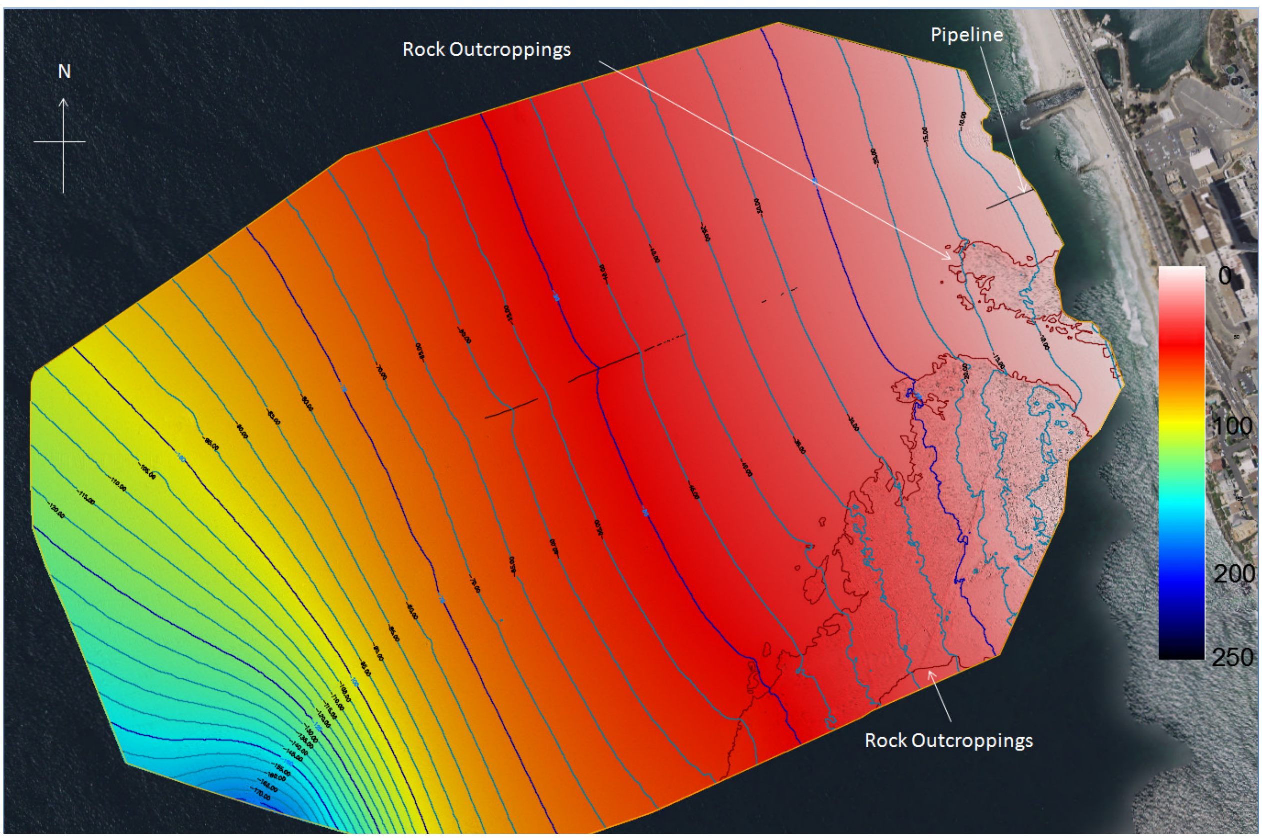


Figure 27 Rock outcroppings in the survey area

e. Kelp Beds

The kelp beds detected correlated with the rock outcropping locations. While not all rock outcroppings were covered in kelp, all kelp beds were detected in rock outcropping areas. Kelp beds were detected on the larger rock outcropping area at depths of 15 to 50ft. No kelp beds were noted on the smaller, western rock outcropping area. The largest area of kelp was 9.5acres. Smaller kelp beds around 0.05 acres were also identified on adjacent smaller rock outcropping areas. The map below shows the location of the kelp beds in Figure 28.

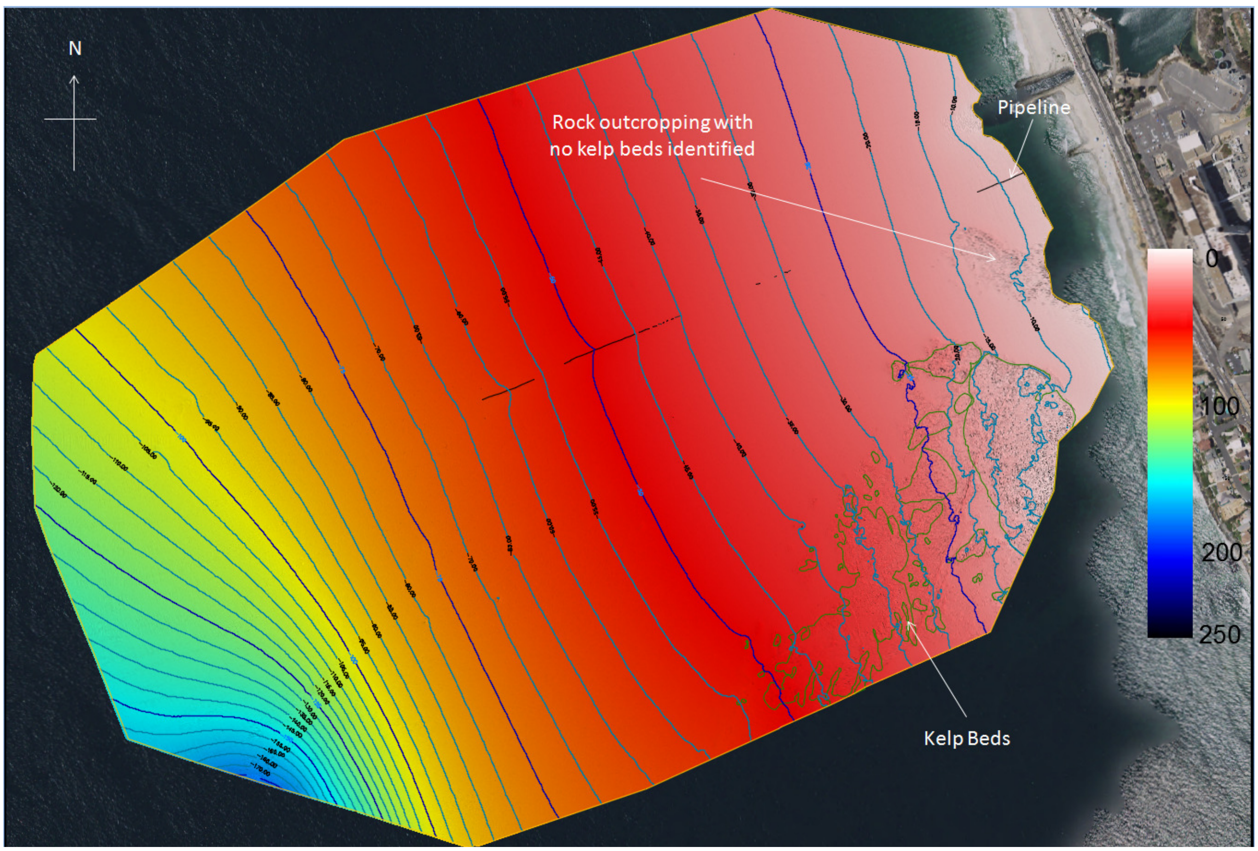


Figure 28 Kelp Beds in the survey area

A comparison to the 2013 dataset in drawing 12-011-D-011 rev 4 shows good agreement between the identification of rock outcropping and kelp beds. Figure 29 and Figure 30 compare the kelp bed extents and rock outcropping extents respectively as identified in 2013 and in 2017. A smaller area was surveyed in 2013, but the kelp beds and rock outcropping locations appear to be similar.

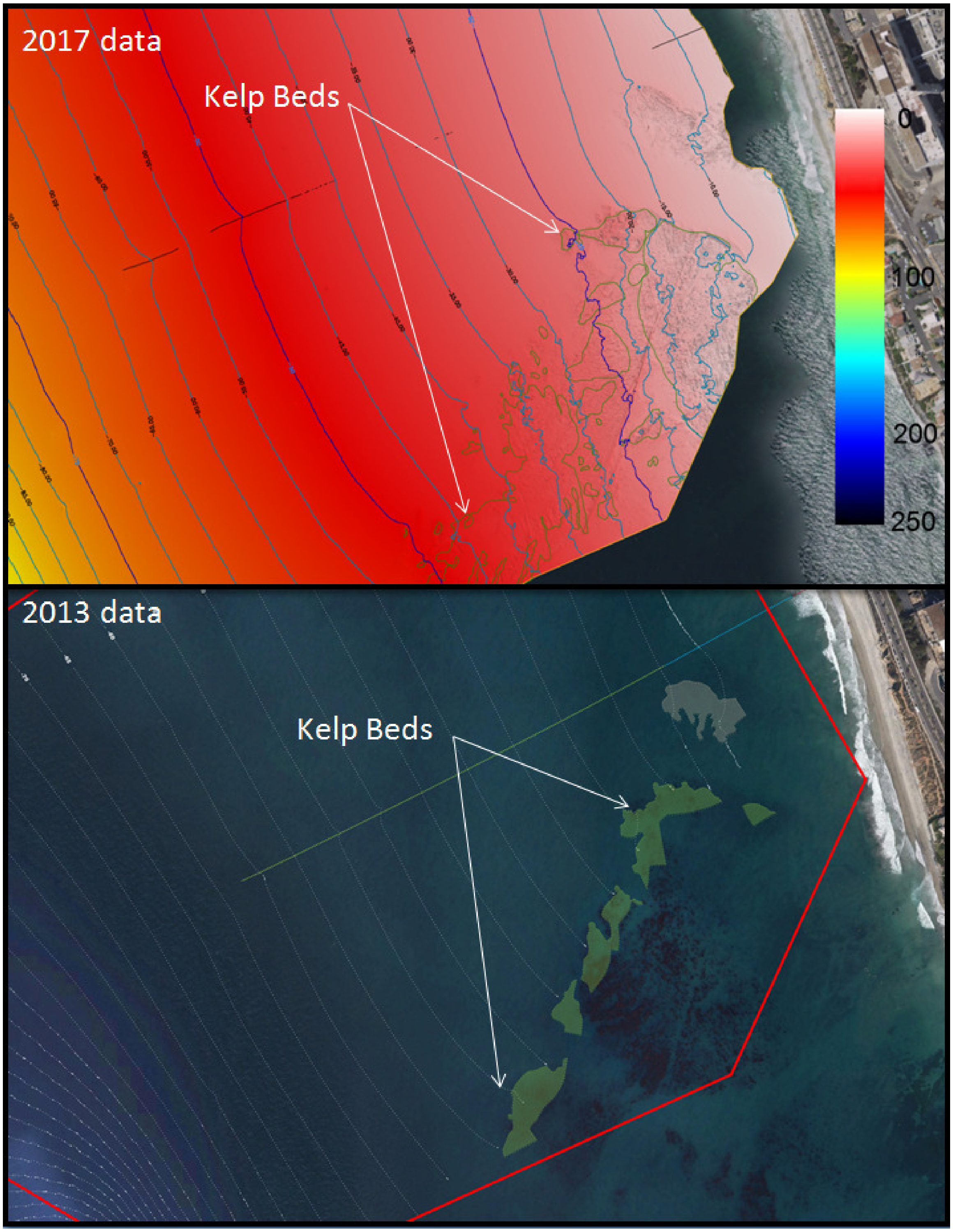


Figure 29 Comparison of the extents of Kelp Beds in 2013 and 2017

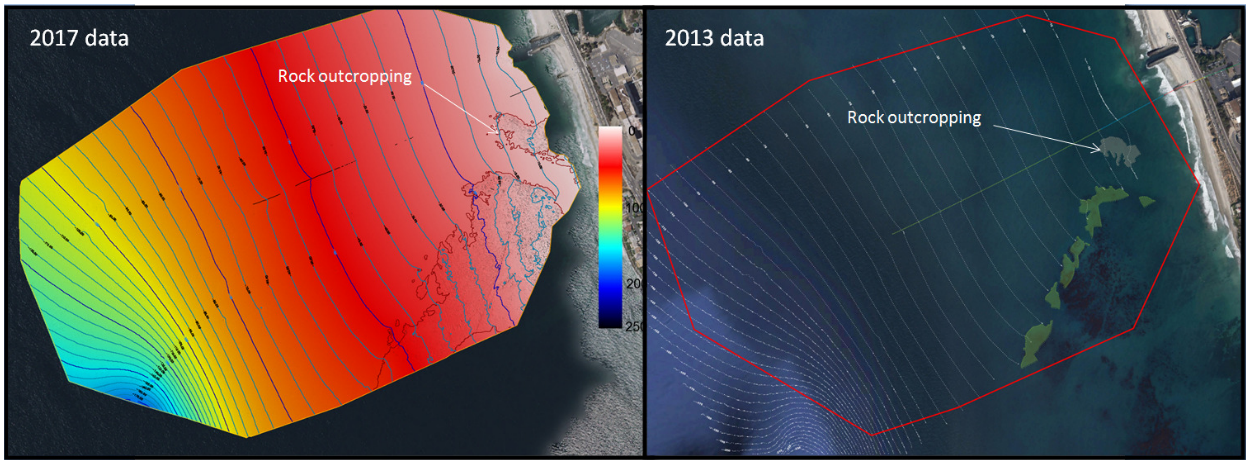


Figure 30 Comparison of the extents of Rock Outcroppings in 2013 and 2017

The rock outcroppings identified in 2017 also correlated with the darker areas in the aerial photography dated 11/2/2012 in drawing 12-011-D-011 rev 4. This is shown below in Figure 31.

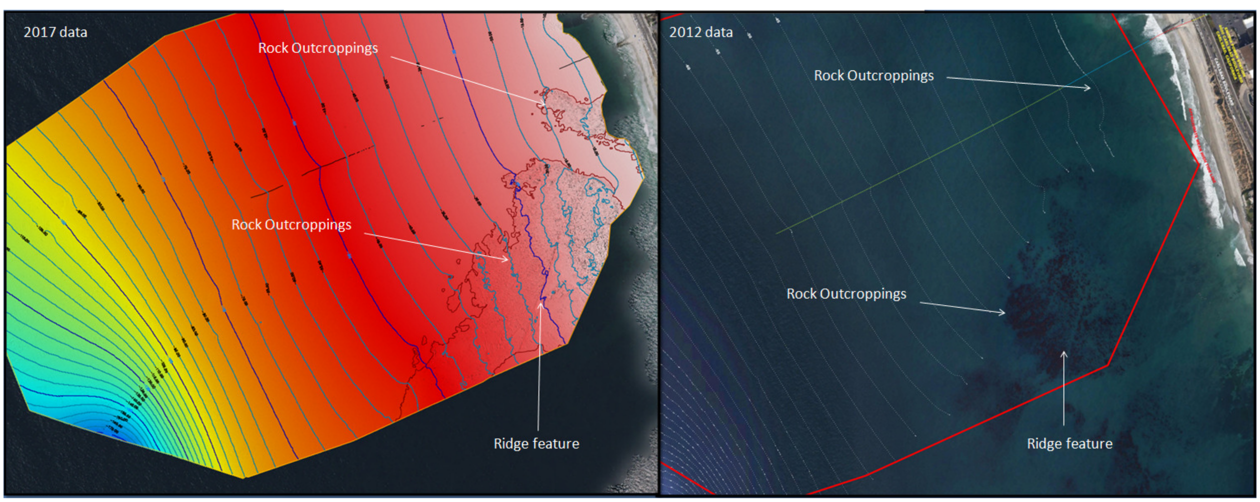


Figure 31 Comparison of rock outcroppings in 2017 data to aerial photography from 2012

A ridge feature was evident in both the 2017 multibeam data and the aerial photography from 2012. The ridge feature is in the middle of the larger rock outcropping in the south west of the survey area. It is on average 1ft deep and 6ft wide and runs the entire length of the rock outcropping (1600ft). The ridge as seen in the multibeam data and aerial photography are shown below in Figure 32.

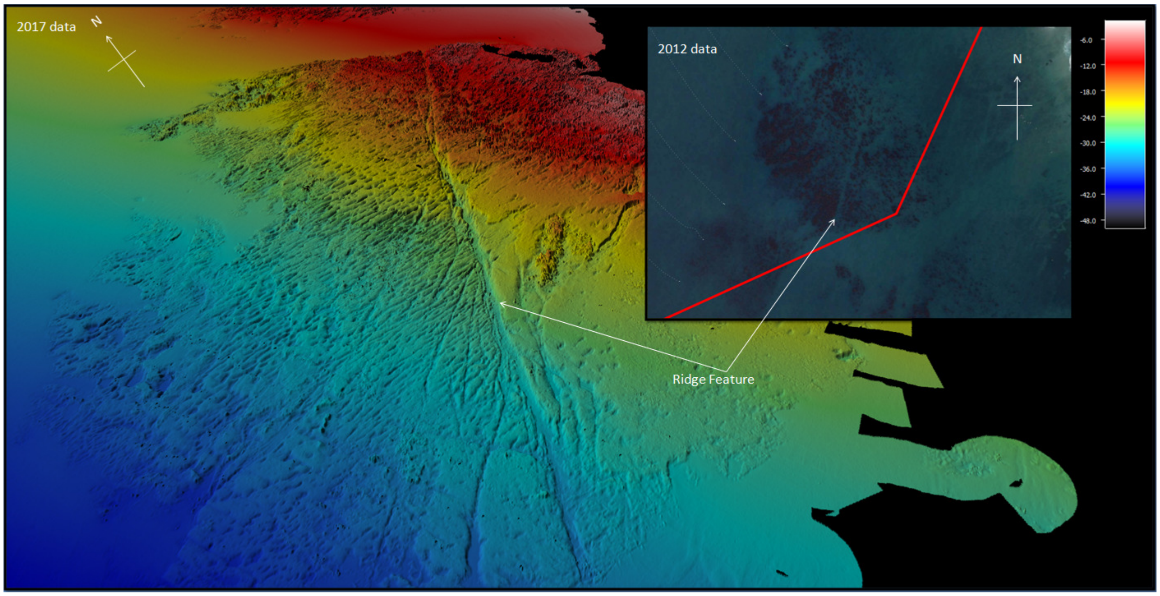


Figure 32 Ridge feature as detected in the 2017 data and evident in the aerial photography in 2012

6. CONCLUSIONS

The conclusions for the pre-decommissioning survey are as follows

- All data was acquired in a safe manner with no incidents
- 200% Coverage was achieved across the entire survey area apart from to shore where data was acquired up to a safe point (up to 5ft MLLW)
- Data acquired achieved all the objectives required.
    - Creating accurate and detailed bathymetry
    - Indentifying rock outcrops and kelp beds
    - Locating the pipeline
    - Locating debris object
- The pipeline was exposed for approximately 1000ft
- Seventeen (17) Debris objects were noted
- Thirty-two (32) Rock objects were noted
- Large rock outcropping areas of up to 44 acres were identified
- The rock outcropping areas were to the south of the pipeline and in the south and south western part of the survey area
- Kelp beds above some of the rock outcroppings were identified

7. DELIVERABLES AND MOVING FORWARD

The following data will be delivered along with this report

- A PDF plot of the survey area with bathymetry and features
- ESRI Arc GIS Shapefiles of the following;
  - Extents of rock outcroppings
  - Extents of kelp beds
  - Pipeline alignments
  - Surface debris objects
  - Rock/Boulders
  - 5ft contours
- Excel geodatabase of debris objects and rocks
- Gridded bathymetry data as 1x1ft XYZ (ASCII text file .xyz)

Disclaimer

All data analysis, interpretations, conclusions, and recommendations in this document are based upon sound scientific principles, using appropriate technology, and have been completed by qualified and experienced hydrographers and marine scientists. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations, or ordinances. eTrac inc. cannot be held liable or responsible for consequences arising from the use of the information presented in this report. All bathymetry data is valid for the time in which the survey was conducted.